



ARTHUR NINTH MARQUIS OF TWEEEDALE

THE
NESTS AND EGGS
OF
INDIAN BIRDS.

BY
ALLAN O. HUME, C.B.

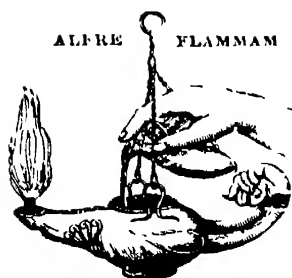
SECOND EDITION.

EDITED BY

EUGENE WILLIAM OATES,
AUTHOR OF 'A HANDBOOK TO THE BIRDS OF BRITISH BURMAH,' AND OF
THE IASBERES IN 'THE PALNA OF BRITISH INDIA'

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EDITOR'S NOTE.

MY task being completed, it is now my pleasant duty to acknowledge the kind assistance I have received in England from many friends; and I take this opportunity of including in the number those gentlemen who have also assisted me in writing the 'Birds of India,' so far as it is completed.

It is needless to say that at the Natural History Museum, South Kensington, I received the utmost assistance from Professor Flower and Dr. Günther, and the latter gentleman placed every facility for work at my disposal. It was a decided improvement to work in the well-appointed room now devoted to Birds in the new Museum instead of the uncomfortable gallery at Bloomsbury where I wrote my 'Birds of Burmah' in 1883; and I must admit that the way in which the enormous additions to the bird-collection during the past few years have been arranged and made available for study by my friend Mr. Bowdler Sharpe must impress everyone with admiration for his industry and powers of organization. Both from him and his colleague Mr. W. R. Ogilvie Grant I have always received the most friendly help on all occasions.

To the Council of the Zoological Society of London I am indebted for the generous loan of the whole of the valuable manuscript notes of Mr. Brian Hodgson, now deposited in their Library.

Among the many friends who have rendered me assistance I may specially mention Licut. H. E. Barnes, Mr. W. T. Blanford, Colonel E. A. Butler, the Marquess Doria, Colonel H. H. Godwin-Austen, Mr. E. Hargitt, Major R. G. Wardlaw Ramsay, Count Salvadori, Mr. P. L. Sclater, Mr. H. Seebohm, Captain G. E. Shelley, and Canon Tristram.

The portraits which are issued with this volume are those of the late Marquess of Tweeddale, Mr. W. E. Brooks, Mr. Bowdler Sharpe, and Mr. W. Davison.

EUGENE W. OATES.

London, 21st August, 1890.

SYSTEMATIC INDEX.

Order HALCYONES.

Family ALCEDINIDÆ.

Subfamily ALCEDININÆ.

	Page
<i>Alcedo bengalensis</i> , Gm.	1
— <i>grandis</i> , Bl.	4
— <i>asiatica</i> , Swains.	6
<i>Ceryle guttata</i> (Fig.)	6
— <i>rudis</i> (Linn.)	8
<i>Pelargopsis gural</i> (Pears.) ..	11
— <i>burmanica</i> , Sharpe	12

Subfamily DACELOINÆ.

<i>Ceyx tridactyla</i> (Pall.)	13
<i>Halcyon smyrnensis</i> (Linn.) ..	15
— <i>occipitalis</i> (Bl.) ..	19

Order CORACIÆ.

Family CYPSELIDÆ.

Subfamily CYPSELINÆ.

<i>Cypselus melba</i> (Linn.)	20
— <i>affinis</i> , J. E. Gr.	21
— <i>batassiensis</i> , J. E. Gr. ..	25
— <i>infumatus</i> , Slater	27
<i>Collocalia unicolor</i> (Jerd.) ..	28
— <i>linchi</i> , Horsf. & M.	33
— <i>spodiopygia</i> (Peale)	35
<i>Macropteryx coronatus</i> (Tick.)	36

Family CAPRIMULGIDÆ.

<i>Batrachostomus moniliger</i> , <i>Loyard</i>	38
— <i>hodgsoni</i> (G. R. Gray) ..	39

	Page
<i>Caprimulgus indicus</i> , Lath. ..	40
— <i>kelaarti</i> , Bl.	41
— <i>albinotatus</i> , Tick.	43
— <i>jotaka</i> , T. & S.	45
— <i>macrurus</i> , Horsf.	45
— <i>andamanicus</i> , Hume	46
— <i>atripennis</i> , Jerd.	47
— <i>unwini</i> , Hume	47
— <i>asiaticus</i> , Lath.	48
— <i>mabratensis</i> Sykes	49
— <i>monticolus</i> , Frankl.	51
<i>Lyncornis cerviniceps</i> , Gould	52

Family CORACIDÆ.

<i>Coracias indica</i> , Linn.	53
— <i>affinis</i> , McClell.	54
— <i>garrula</i> , Linn.	54
<i>Eurystomus orientalis</i> (Linn.)	57

Family MEROPIDÆ.

<i>Nyctioris athertoni</i> (J. & S.)	58
<i>Merops viridis</i> , Linn.	60
— <i>philippinus</i> , Linn.	63
— <i>persicus</i> , Pall.	65
— <i>apiaster</i> , Linn.	66
<i>Melittophagus quinticolor</i> (Vieill.)	67

Order BUCEROTES.

Family BUCEROTIDÆ.

<i>Dichoceros bicornis</i> (Linn.) ..	68
<i>Anthracoceros albirostris</i> (Shaw)	72

	Page
<i>Ocyrocus birostris</i> (Shaw) . . .	74
<i>Anorrhinus tickelli</i> (Bl.) . . .	76
<i>Aceros nepalensis</i> (Hodgs.) . .	77
<i>Rhytidoceros undulatus</i> (Shaw)	80
— <i>subruficollis</i> (Bl.)	81

Order PSITTACI.

Family PSITTACIDÆ.

<i>Palæornis eupatrius</i> (Linn.) . .	82
— <i>torquatus</i> (Bodd.)	85
— <i>purpureus</i> (P. L. S. Mull.)	87
— <i>cyancephalus</i> (Linn.) . . .	88
— <i>schisticeps</i> , Hodgs.	89
— <i>columboides</i> , Vig.	89
— <i>calthropæ</i> , Layard	90
— <i>fasciatus</i> (P. L. S. Mull.) .	90
— <i>nicobaricus</i> , Gould	91
<i>Loriculus vernalis</i> (Sparrm.) .	92

Order STRIGES.

Family STRIGIDÆ.

<i>Strix javanica</i> , Gm.	93
— <i>candida</i> , Tick.	95

Family BUBONIDÆ.

<i>Ketupa ceylonensis</i> (Gm.) . .	96
— <i>javanensis</i> , Less.	98
<i>Bubo bengalensis</i> (Frankl.) . .	99
— <i>coromandus</i> (Lath.)	101
<i>Scops pennatus</i> , Hodgs.	103
— <i>spilocephalus</i> (Blyth) . . .	104
— <i>lettia</i> , Hodgs.	104
— <i>plumipes</i> , Hume	105
— <i>bakkamuna</i> (Forst.)	105
— <i>malabaricus</i> , Jerd.	107
— <i>lemipiji</i> (Horsf.)	107
<i>Carine brama</i> (Temm.)	108
<i>Ninox scutulata</i> (Ruff.) . . .	111
<i>Glaucidium brodiei</i> (Burton) .	111
— <i>castaneonotum</i> (Blyth) . .	112
— <i>radiatum</i> (Tick.)	112
— <i>malabaricum</i> (Blyth) . . .	113
— <i>cuculoides</i> (Vigors)	113
<i>Syrnium sinense</i> (Lath.) . . .	114
— <i>ocellatum</i> , Less.	115
— <i>newarense</i> (Hodgs.)	116

Order ACCIPITRES.

Family FALCONIDÆ.

Subfamily ACCIPITRINÆ.

	Page
<i>Circus ærgineus</i> (Linn.) . . .	117
<i>Astur palumbarius</i> (Linn.) . .	118
— <i>trivirgatus</i> (Temm.) . . .	119
— <i>badius</i> (Gmel.)	119
— <i>poliopsis</i> (Hume)	121
<i>Accipiter nisus</i> (Linn.)	122
— <i>melanoschistus</i> , Hume . .	123
— <i>virgatus</i> (Reinw.)	124

Subfamily BULIIONINÆ.

<i>Buteo ferox</i> (S. G. Gmel.) . .	125
--------------------------------------	-----

Subfamily AQUILINÆ.

<i>Gypætus barbatus</i> (Linn.) . .	127
<i>Aquila chrysaetos</i> (Linn.) . . .	129
— <i>bifasciata</i> , J. E. Gray . . .	131
— <i>vinthiana</i> , Frankl.	132
— <i>hastata</i> (Less.)	136
— <i>clanga</i> , Pall.	138
<i>Nisaetus fasciatus</i> (Vieill.) . .	139
— <i>pennatus</i> (Gmel.)	144
<i>Neopus malayensis</i> (Reinw.) .	145
<i>Spizaetus nepalensis</i> (Hodgs.) .	145
— <i>cirratus</i> (Gmel.)	147
— <i>limnaetus</i> (Horsf.)	149
<i>Circæus gallicus</i> (Gmel.) . . .	150
<i>Spilornis cheela</i> (Lath.)	153
— <i>melanotis</i> (Jerd.)	156
— <i>rutherfordi</i> , Steinh.	156
— <i>spilogaster</i> (Blyth)	157
<i>Butastur teesa</i> (Frankl.) . . .	158
— <i>liventer</i> (Temm.)	161
<i>Haliaetus leucogaster</i> (Gmel.) .	161
— <i>leucorhynchus</i> (Pall.) . . .	163
<i>Policæus ichthyæus</i> (Horsf.) .	167
— <i>plumbeus</i> (Hodgs.)	169
<i>Haliaetus indus</i> (Bodd.) . . .	170
<i>Milvus govinda</i> , Sykes	173
— <i>affinis</i> , Gould	176
— <i>melanotis</i> , Temm. & Schleg.	176
<i>Elanus ceruleus</i> (Desf.) . . .	177
<i>Pernis ptilorhynchus</i> (Temm.)	181

Subfamily FALCONINÆ.

<i>Microhierax cærulescens</i> (Linn.)	183
— <i>fringillarius</i> (Drap.) . . .	183
<i>Falco peregrinator</i> , Sander . .	184

	Page
<i>Falco atriceps</i> , <i>Hume</i>	185
— <i>jugger</i> , <i>J. E. Gray</i>	186
— <i>chicquera</i> , <i>Daud.</i>	192
<i>Tinnunculus alaudarius</i> (<i>Linn.</i>)	195

Family VULTURIDÆ.

<i>Gyps fulvoscens</i> , <i>Hume</i>	199
— <i>himalayensis</i> , <i>Hume</i>	200
— <i>indicus</i> (<i>Scop.</i>)	202
— <i>pallascens</i> , <i>Hume</i>	203
<i>Pseudogyps bengalensis</i> (<i>Gmel.</i>)	205
<i>Otogyps calvus</i> (<i>Scop.</i>)	206
<i>Neophron ginginianus</i> (<i>Lath.</i>) ..	213

Order PLATALEÆ.

Family PLATALEIDÆ.

<i>Platalea leucorodia</i> , <i>Linn</i>	217
---	-----

Family TANTALIDÆ.

<i>Tantalus leucocephalus</i> , <i>Forst.</i>	220
---	-----

Family ANASTOMATIDÆ.

<i>Anastomus oscitans</i> (<i>Bodd.</i>) ..	224
---	-----

Family IBIDIDÆ.

<i>Ibis melanocephala</i> (<i>Lath.</i>) ..	226
<i>Inocotis papillosus</i> (<i>Temm.</i>) ..	228
<i>Grptocephalus davisoni</i> (<i>Hume</i>)	231
<i>Plegadis falcinellus</i> (<i>Linn.</i>) ..	231

Order HERODIONES.

Family ARDEIDÆ.

<i>Ardea goliath</i> , <i>Temm.</i>	232
— <i>insignis</i> , <i>Hodgs.</i>	232
— <i>cinerea</i> , <i>Linn.</i>	233
— <i>purpurea</i> , <i>Linn.</i>	235
<i>Herodias alba</i> (<i>Linn.</i>)	237
— <i>intermedia</i> , <i>van Hass.</i> ..	240
— <i>garzetta</i> , <i>Linn.</i>	242
<i>Denniegretta gularis</i> (<i>Bosc</i>) ..	244
— <i>sacra</i> (<i>Gmel.</i>)	246
<i>Bubulcus coromandus</i> (<i>Bodd.</i>) ..	247
<i>Ardeola grayi</i> (<i>Sykes</i>)	248
<i>Butorides javanica</i> (<i>Horsf.</i>) ..	249
<i>Ardeiralla flavicollis</i> (<i>Lath.</i>) ..	251

	Page
<i>Ardetta cinnamomea</i> (<i>Gmel.</i>) ..	252
— <i>siuensis</i> (<i>Gmel.</i>)	255
— <i>minuta</i> (<i>Linn.</i>)	257
<i>Nyctiardea nycticorax</i> (<i>Linn.</i>) ..	258

Family CICONIIDÆ.

<i>Leptoptilus argula</i> (<i>Lath.</i>) ..	260
— <i>javanicus</i> (<i>Horsf.</i>)	264
<i>Xenorhynchus asiaticus</i> (<i>Lath.</i>) ..	265
<i>Dissura episcopus</i> (<i>Bodd.</i>)	268

Order STEGANOPODES.

Family

PHALACROCORACIDÆ.

<i>Phalacrocorax carbo</i> (<i>Linn.</i>) ..	270
— <i>fuscollis</i> , <i>Steph.</i>	272
— <i>pygmaeus</i> (<i>Pall.</i>)	273
<i>Plotus melanogaster</i> (<i>Penn.</i>) ..	274

Family PELECANIDÆ.

<i>Pelecanus manillensis</i> , <i>Gmel.</i> ..	276
--	-----

Order ANSERES.

Family ANATIDÆ.

Subfamily ANSERINÆ.

<i>Anser cinereus</i> , <i>Meyer</i>	279
— <i>indicus</i> (<i>Lath.</i>)	279
<i>Nettapus coromandelianus</i> (<i>Gmel.</i>)	280

Subfamily ANATINÆ.

<i>Sarcidiornis melanonotus</i> (<i>Penn.</i>)	282
<i>Dendrocygna javanica</i> (<i>Horsf.</i>) ..	284
— <i>fulva</i> (<i>Gmel.</i>)	286
<i>Tadorna casarca</i> (<i>Linn.</i>)	286
<i>Anas leucoptera</i> (<i>Blyth</i>)	287
— <i>boschas</i> , <i>Linn.</i>	288
— <i>pæcilorhyncha</i> (<i>Forst.</i>) ..	289
<i>Rhodonesia caryophyllacea</i> (<i>Lath.</i>)	290
<i>Querquedula gibberifrons</i> (<i>S.</i> <i>Müll.</i>)	290
— <i>circia</i> (<i>Linn.</i>)	291
<i>Fuligula nyroca</i> (<i>Güldenst.</i>) ..	292

Order GAVIÆ.

Family LARIDÆ.

Subfamily LARINÆ.

	Page
<i>Larus brunneicephalus</i> , <i>Jerd.</i>	293
— <i>hemprichi</i> , <i>Bonap.</i>	293
— <i>gelastes</i> , <i>Licht.</i>	294

Subfamily STERNINÆ.

<i>Sterna caspia</i> , <i>Pall.</i>	295
— <i>bergii</i> , <i>Licht.</i>	297
— <i>anæstheta</i> , <i>Scop.</i>	300
— <i>dougalli</i> , <i>Mont.</i>	301
— <i>melanauchen</i> , <i>Temm.</i>	302
— <i>fuliginosa</i> , <i>Gmel.</i>	303
— <i>anglica</i> , <i>Mont.</i>	304
— <i>hybrida</i> (<i>Pall.</i>)	305
— <i>serna</i> , <i>Sykes</i>	308
— <i>melanogastra</i> , <i>Temm.</i>	310
— <i>sinensis</i> , <i>Gmel.</i>	312
<i>Anous stolidus</i> (<i>Linn.</i>)	315
<i>Rhynchops albicollis</i> , <i>Swains.</i>	316

Family GLAREOLIDÆ.

<i>Glareola pratincola</i> (<i>Linn.</i>)	318
— <i>orientalis</i> (<i>Leach</i>)	319
— <i>lactea</i> , <i>Temm.</i>	320

Family CURSORIIDÆ.

<i>Cursorius coromandelicus</i> (<i>Gmel.</i>)	323
— <i>gallicus</i> (<i>Gmel.</i>)	325

Family DROMADIDÆ.

<i>Dromas ardeola</i> , <i>Payk.</i>	327
--	-----

Family ŒDICNEMIDÆ.

<i>Œdicnemus scolopax</i> (<i>S. G.</i> <i>Gmel.</i>)	331
<i>Esacus magnirostris</i> (<i>Geoffr.</i> <i>St.-Hil.</i>)	334
— <i>recurvirostris</i> (<i>Cuv.</i>)	335

Order LIMICOLÆ.

Family CHARADRIIDÆ.

<i>Ægialitis cantiana</i> (<i>Lath.</i>)	337
— <i>dubia</i> (<i>Scop.</i>)	338
— <i>jerdoni</i> (<i>Legge</i>)	340

Page

<i>Lobivanellus indicus</i> (<i>Bodd.</i>)	340
— <i>atrinuchalis</i> (<i>Blyth</i>)	344
<i>Lobipluvia malabarica</i> (<i>Bodd.</i>)	345
<i>Hoplopterus ventralis</i> (<i>Wagl.</i>)	347

Family SCOLOPACIDÆ.

<i>Scolopax rusticola</i> , <i>Linn.</i>	349
<i>Gallinago nemoricola</i> , <i>Hodgs.</i>	350
<i>Rhynchæa capensis</i> (<i>Linn.</i>)	350
<i>Tringoides hypoleucus</i> (<i>Linn.</i>)	352
<i>Himantopus candidus</i> , <i>Bonn.</i>	353

Family PARRIDÆ.

<i>Metopidius indicus</i> (<i>Lath.</i>)	356
<i>Hydrophasianus chirurgus</i> (<i>Scop.</i>)	358

Order GRALLÆ.

Family PTEROCLIDÆ.

<i>Pterocles exustus</i> , <i>Temm.</i>	361
— <i>fasciatus</i> (<i>Scop.</i>)	364
— <i>senegalus</i> (<i>Linn.</i>)	366

Family TURNICIDÆ.

<i>Turnix taigoor</i> (<i>Sykes</i>)	367
— <i>tanki</i> , <i>Buck. Ham.</i>	370
— <i>dussumieri</i> , <i>Temm.</i>	371

Family GRUIDÆ.

<i>Grus antigone</i> (<i>Linn.</i>)	372
---	-----

Order FULICARIÆ.

Family OTIDIDÆ.

<i>Eupodotis edwardsi</i> (<i>J. E.</i> <i>Gray</i>)	375
<i>Sypheotis bengalensis</i> (<i>P. L. S.</i> <i>Mull.</i>)	378
— <i>aurita</i> (<i>Lath.</i>)	380

Family RALLIDÆ.

<i>Porphyrio poliocephalus</i> (<i>Lath.</i>)	384
<i>Fulica atra</i> , <i>Linn.</i>	386
<i>Gallicrex cinereus</i> (<i>Gmel.</i>)	387
<i>Gallinula chloropus</i> (<i>Linn.</i>)	389
<i>Erythra phœnicura</i> (<i>Penn.</i>)	391
<i>Porzana pusilla</i> (<i>Pall.</i>)	395
— <i>fusca</i> (<i>Linn.</i>)	396

	Page
Porzana akool (<i>Sykes</i>)	308
Rallina canningi (<i>Tytl.</i>)	308
Hypotaenidia striata (<i>Linn.</i>) . .	309
— obscuriora, <i>Hume</i>	400

Order PYGODES.

Podiceps cristatus (<i>Linn.</i>) . .	401
Tachybaptus fluviatilis (<i>Tunst.</i>)	401

Order GALLINÆ.

Family PHASIANTIDÆ.

Pavo cristatus, <i>Linn.</i>	405
Lophophorus impeyanus (<i>Lath.</i>)	407
Cerionis satyra (<i>Linn.</i>)	409
— melanocephalus (<i>Gray</i>)	410
Pucrasia macrolopha (<i>Less.</i>) . .	411
Phasianus wallichi (<i>Hardw.</i>) . .	412
Euplocamus albicristatus (<i>Vig.</i>) .	413
— melanonotus, <i>Blyth</i>	415
— horsfieldi, <i>G. R. Gray</i>	416
— lineatus (<i>Lath.</i>)	416
Gallus ferrugineus (<i>Gmel.</i>) . . .	417
— sonnerati, <i>Temm.</i>	420
— lafayettii, <i>Less.</i>	422
Gallinula porphyrio (<i>Gmel.</i>) . . .	423
— lunulatus (<i>Vale.</i>)	425
— bicalcaratus (<i>Penn.</i>)	426

Family TETRAONIDÆ.

	Page
Tetraogallus himalayensis, <i>G.</i> <i>R. Gray</i>	426
Lerwa nivicola, <i>Hodgs.</i>	428
Francolinus vulgaris (<i>Steph.</i>) . .	428
— pictus (<i>J. & S.</i>)	430
— chinensis (<i>Osb.</i>)	431
Caccabis chukor (<i>J. L. Gray</i>) . .	431
Anmoperdix bonhami (<i>G. R.</i> <i>Gray</i>)	433
Ortygornis pondicerianus (<i>Gmel.</i>)	435
— gularis (<i>Temm.</i>)	437
Perdix hodgsoniae, <i>Hodgs.</i> . . .	438
Arboricola atrigularis, <i>Blyth</i> . .	439
— rufigularis, <i>Blyth</i>	439
— intermedia, <i>Blyth</i>	440
Perdicula asiatica (<i>Lath.</i>)	440
— argoondah (<i>Sykes</i>)	441
Microperdix erythrorhynchus (<i>Sykes</i>)	442
Coturnix communis, <i>Bonn.</i> . . .	443
— coromandelica (<i>Gmel.</i>)	444
Excalfactoria chinensis (<i>Linn.</i>) .	448

Family MEGALOPIDIDÆ.

Megalopodius nicobariensis, <i>Blyth</i>	449
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ERRATA IN VOL. II.

- Page 67. For *The Golden Wood-Chat* read *The Golden Bush-Robin*.
" 68. For *The Red-flanked Wood-Chat* read *The Red-flanked Bush-Robin*.
" 60. For *The Blue-headed Wood-Chat* read *The Blue-headed Robin*.
" 114. After **Tharrhaleus jerdoni** (Brooks) read *Jerdon's Accentor*.
" 212. For **Anthus sordidus**, Rupp., read **Anthus cockburniæ**,
Oates.
, , For **Anthus jerdoni** (Finsch) read **Anthus similis**, Jerdon.

THE
NESTS AND EGGS
OF
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Family ALCEDINIDÆ.

Subfamily ALCEDININÆ.

Alcedo bengalensis, Gmel. *The Little Indian Kingfisher*.

Alcedo bengalensis, Gmel., *Jerd. B. Ind.* i, p. 230; *Hume, Rough Draft N. & E.* no. 134.

The breeding-season of the Little Indian Kingfisher seems to vary very materially according to locality. In Madras Davison found, as he considers, a nest in January; in the Nilghiris and the Deccan it lays in March. I got them in the Doon and in the Terai below Darjeeling during May, and Captain Cock obtained them in June in Cashmere. They bore a very narrow hole, rarely exceeding 2 feet in depth and often scarcely half so long, in some bank immediately overlooking water (running water by choice) at a height of from 6 inches to 5 feet above the water-level. The passage, which is barely 2 inches in diameter, terminates in a little circular domed chamber, perhaps 5 inches in diameter and 3 or 4 in height, in which the eggs, from five to seven in number, are deposited. Every nest that I have seen contained a quantity of hair-like fish-bones, and in one case the eggs reposed on a little

patch of these, but that they are there placed *as* a lining I can hardly credit, as in the majority of cases there are fewer bones under the eggs than elsewhere in the chamber and passage.

Mr. B. Thompson tells me that "in the Bhabur and Kumaon Terai this species breeds from March to May, in long narrow holes dug out by the birds on the banks of small running streams."

Captain Hutton says:—"On the 14th of June we took five semitransparent fleshy-white eggs out of a hole in the bank of a stream in the Dehra Doon."

Messrs. Davidson and Wenden remark of this bird in the Deccan:—"Fairly common and breeds. A nest taken at Satara in June."

Writing from Ahmednugger in the Deccan, Rev. H. Bruce said:—"March 15th, 1869. Found this day at Ruhuri two nests of *Alcedo bengalensis*, in one of which were six eggs and in the other five; the first nest was built in the bank of the river about 2 feet above the water; the hole was about 2 inches in diameter, dug horizontally in the sandy bank to the depth of 12 or 14 inches, and at the end of this was an excavation about 5 inches in diameter. The eggs were laid in a hollow at the bottom of this excavation; there was a layer of fragments of fish-bones upon the earth, and the eggs were laid upon this. The other nest was not more than a foot above the water-level, but in other respects similar to the first. Both nests were placed directly over the water, the first over *standing* water and the second over *running* water."

Colonel Butler writes:—"Belgaum, 22nd August, 1879. Four eggs about to hatch. The nest-hole was situated in a bank overlooking a small tank about 2 feet from the level of the water, and the eggs were deposited in a good-sized chamber on the bare ground without any nest, about a foot from the entrance of the hole.

"On the 24th August I observed either the same or another pair commencing a nest in another tank close by—the bank in which they were boring being about 7 feet high, overlooking the water and facing a public road along which people were constantly passing to and fro the whole day. There were two spots much marked by the white droppings of the old birds, near the nest, one an old root growing out of the bank, the other a projecting clod of earth, upon one of which one or other of the birds invariably sat. Upon this date, from the actions of the birds, I came to the conclusion that they were only clearing out the hole. One of the birds, presumably the hen, sat on one of the perches outside of the nest until the other arrived, when she immediately left her perch and entered the nest-hole. After a minute or two the other bird (cock presumably) left his perch and passed the hole, uttering a short shrill twitter as he flew by, upon which the hen emerged from the hole and resumed her seat on the perch till the cock returned, which was usually in about four or five minutes, during which she started down occasionally into the water below to catch

small fish. I watched this procedure for about an hour and a half, the same bird always going into the hole and coming out again as soon as the other one gave her warning of his departure. No doubt these precautions were adopted to prevent the hen bird being surprised and captured in the hole whilst excavating. On the 31st I returned to the spot about 9 A.M., and found the cock bird on his usual perch guarding the nest. After waiting for about a quarter of an hour, the hen flew out of the nest-hole and took possession of the vacant perch, and the cock flew away to some swampy ground adjoining. In a few minutes the hen flew away also, but soon returned again and commenced fishing in the water below, and as she did not seem inclined to return to the nest I came to the conclusion that she had only gone on to the nest to lay, and consequently I left the tank with the intention of returning again in two or three days' time. On the 3rd September I revisited the place, and found the cock bird as usual on duty on his perch, and after watching him for about twenty minutes he suddenly left his perch and entered the nest-hole, immediately after which both birds came out of the hole together and flew to their respective perches. The hen then left the tank, and the cock as soon as she had gone re-entered the nest-hole.

"Satisfied at last that the birds were sitting, and that the cock had gone on to the nest to sit whilst the hen was away procuring food, I walked quietly up to the bank and put a lauding-net over the hole, catching him as he flew out. I then waited for upwards of an hour, intending to catch the hen also, but as she did not return, and as it was getting late in the day, I cut into the hole and secured seven beautiful fresh eggs. The nest-hole, which was about 3 feet above the level of the water, consisted of a narrow passage about 2 inches in diameter running obliquely upwards into the bank, and terminating about a foot from the entrance in a large domed chamber some 5 or 6 inches in diameter. The eggs, which were covered all over with the surrounding red soil from the birds' feet, were almost spherical, and, when washed and blown, of the purest white and very highly glossed, and deposited on the bare ground, without even a depression to lie in and no signs whatever of a nest.

"I fancy the Rains is the season at which they breed in this part of the country."

He adds:—"Breeds in the Eastern Narra, Sind, in holes of canal-banks. Mr. Doig took the eggs between 12th October and 2nd December."

Mr. Davison says:—"I took the nest of this species at Ootacamund in the last week of March. The nest was in a clay bank of a stream about 5 feet above the surface of the water. The diameter of the entrance of the tunnel was about 1.75 inch, and went straight into the bank for about 2 feet, where it terminated in a small chamber 4 inches in diameter, which contained four perfectly fresh, almost round, very glossy, pinky-white eggs. There was no attempt at a lining to the chamber beyond the few odd scraps of

small minnow-bones. I once found what may have been intended for a nest in Madras towards the latter end of January, in a well; what I supposed to be the nest was placed in a hole in the masonry lining of the well, and round the entrance of the hole was accumulated a rather large quantity of small partially decayed fish and fish-bones; but these had been placed there apparently not as a lining, but with the object of keeping the eggs in the hole, as it was one left when the scaffolding was removed, and consequently had a perfectly flat floor. I should, however, add that though the bird was in the hole, it contained no eggs, and *may* therefore have been only a resting-place."

Mr. J. Darling, Junior, says:—"I found a nest of this bird at Neddiwuttum on the Nilghiris, at about 6000 feet above the sea, on the 19th April, 1870. The nest was in the bank of a large stream, about 2 feet from the water, a circular passage 4 inches in diameter and 2 feet deep, terminating in a chamber about 8 inches by 4. There were a few fish-bones scattered about, and plenty of decaying insects and small fish, making a fearful stench. There were six quite fresh eggs. In Wynaad they breed plentifully from March to May. I have unfortunately always got young ones down here."

Writing from Burma, Major Wardlaw Ramsay remarks:—"I found a nest in the side of an old well in some thick jungle near Rangoon, at about 5 feet from the surface; it contained seven eggs."

Colonel Legge writes, in his 'Birds of Ceylon':—"In South, West, and Central Ceylon the breeding-season of this species is from February until June, but in the north I have known it to nest in November."

The eggs are exquisitely glossy, and, when blown, china-white, little ovals, or, some few of them, almost spherical. They are very like those of *Merops viridis*, but more glossy, and, as a rule, somewhat less round. When unblown, they are pinky white.

In length they vary from 0.75 to 0.87 inch, and in breadth from 0.65 to 0.72 inch; but the average, yielded by a large series of measurements, is 0.8 by 0.68 inch.

***Alcedo grandis*, Blyth. *The Great Indian Kingfisher*.**

Alcedo euryzona, Temm., *Jerd. B. Ind.* i, p. 231.

Alcedo grandis, Blyth, *Hume, Cat.* no. 135.

A correspondent of the 'Asian,' apparently writing from the north-east part of the Empire under the name of "Rekab," says:—

"I have taken only two nests of this bird, and one other I have had shown me after the eggs and hen bird had been taken and brought to me. All three nests were placed, as is usual, at the end of a tunnel dug in the earth by the bird itself. In one the nest was placed in a chamber at the end of a burrow scarce a foot deep, and in another case the burrow was hardly two feet; but

in both instances the excavation had been in extremely hard clayey soil; the third, which was made in soft, sandy soil, was nearly six feet deep. In every case the nest was made of fish-bones; but in one nest a little moss had also been put down over the bones. On both occasions on which I took the nest, it emitted a very strong stench on being opened out to the air. Of the three nest-holes, two were dug in deep ravines through which a little water trickled during the rains, the banks were densely covered with forest, and no sunshine could penetrate at any time of the day; the third hole was made amongst the roots of a tree growing on the steep slope of a hill-side and amongst extremely close bamboo jungle. The entrance to the hole was so placed as to be in deep shade throughout the day. The tunnels are made sloping upwards towards the chamber, so that no water can possibly penetrate to it.

"The eggs are from two to six in number and are not shaped an absolute round. In the first clutch I took, or rather had brought to me, the shape was not particularly noticeable; but in the second clutch the eggs were of a short but most distinct oval. This may prove to have been an exceptionally shaped lot; but I shall have to wait another year or so before I can say for certain.

"The eggs are, of course, white and very highly glossed.

"The three nests were taken on the 14th, 17th, and 21st of April, 1889. On the 14th and 21st the hen bird was captured on the nest, in one case by hand and in the other by a noose placed at the entrance; in the third the hen bird was shot by myself whilst leaving the nest; and on the same day a male, presumably the mate, was shot lower down in the same ravine.

"In May 1888 I had some young birds of this species, which were the first I had seen, brought to me; they were then fully fledged and ready to fly.

"This Kingfisher is one of the rarest, if not the rarest, of those to be found on the continent of India, and its extremely shy habits make it even more difficult to obtain, whilst observation of its habits can only be obtained by chance. It keeps to nullahs and ravines in the densest evergreen jungle, and appears to feed on fish, tadpoles, and the larger insects. Only once have I been able to observe it feeding, and that was in December, 1888, when I for some time watched a male bird that was fishing in a small rivulet running through steep and well-wooded banks. Its actions appeared to be much the same as those of *Alcedo bengalensis*; but, unlike that bird, it always returned to its perch after an attempt, successful or otherwise, to take a fish, whereas the little *A. bengalensis* seems always to 'move on.' Whilst I was looking on he caught some half dozen fish, mostly very small ones; but one was, I should say, nearly three inches long, and which he only swallowed with some difficulty, tossing his head up and jerking the fish about until he got it properly fixed head downwards; the smaller fry seemed to be swallowed at once irrespective of their

positions. The bird seemed to be successful at taking a fish not more than once in every six or seven attempts. I often wondered at people talking of the wonderful accuracy with which Kingfishers dive after fish. I have often had the curiosity to count their attempts, successful and otherwise, and my experience goes to show that *A. bengalensis* is the most expert and that *Ceryle rudis*, about which people talk most, is the least accurate. I have seen him fail twenty-three times running.

"The plumage of *A. grandis* presents a most striking contrast when seen in sunlight and in shade. In the former the bird appears to be glistening blue alone, whilst, when in shadow, the whole bird looks a sombre black.

"It is a very silent bird; its note, like that of the Indian Kingfisher, but softer, is only heard when the bird is on the wing, and then very rarely, as it usually gives one cry just after starting, and then relapses in silence. Its flight is exceedingly rapid, and, like all Kingfishers, this bird appears to lean from side to side in flying; before perching it always flies *upwards*, not *down*, to the intended place."

Alcedo asiatica*, Swains. *The Malayan Kingfisher.

Alcedo meninting, Horsf., *Hume*, *Cat.* no. 135 ter.

Alcedo beavani, Wald., *Hume*, *Cat.* no. 135 quat.

Mr. Oates, writing from Pegu, records the following note regarding this beautiful Kingfisher:—"July 2nd; nest in the steep bank of a ravine in thick forest. Gallery about one and a half feet long, terminating in a small chamber. Eggs four, laid on the bare soil; very glossy and round, white; size .78 by .69, .76 by .7, .75 by .7, and .8 by .68. July 14th; nest with nearly full-grown young in similar situation."

Ceryle guttata* (Vigors). *The Pied Himalayan Kingfisher.

Ceryle guttata (Vig.), *Jerd. B. Ind.* i, p. 234; *Hume*, *Rough Draft N. & E.* no. 137.

The Pied Himalayan Kingfisher breeds undoubtedly in the banks of all the larger streams of the Sub-Himalayan ranges, but I have only once succeeded in meeting with a nest, and that was in June in a stream below Subatoo, and it unfortunately contained four young birds. It was a large hole fully 4 inches in diameter, ran about 18 inches into the bank of loose decomposed shale, and terminated in a chamber containing a quantity of fish-bones and grass, fully 10 inches in diameter. Mr. R. Thompson tells me:—"The large Pied Kingfisher breeds from April to June in the banks of the larger well-wooded streams, frequently in the deepest parts of forests. Sometimes and more commonly they breed in holes dug out by themselves, at others they suit themselves to ledges and shelves of rocks! Three or four is the usual number of

young ones. The old birds may often be seen carrying fishes from 6 to 7 inches in length to feed the young ones with. The fish are always swallowed whole."

Mr. J. Inglis writes from Cachar:—"This large Pied Kingfisher is only to be found in the mountain rivers or streams. I have not observed a single bird near stagnant or slow-running water; it is seen nearly always in pairs. Breeds in March."

A correspondent of the 'Asian,' apparently writing from Cachar, and signing himself "Rekab," says:—

"As I have only taken one nest of this bird, I describe that in detail, others are sure to resemble it very closely. It was placed at the end of a hole excavated in a high bank, and placed at about three feet from the top and fully twenty feet above the level of the water. The tunnel, independent of the chamber at the end, was only about two feet deep; and as the soil was of a very loose, sandy nature, and quite without stones or pebbles of any kind, this would seem to show that this bird is not in the habit of burrowing to any great depth. *A. bengalensis* or *Ceryx tridactyla* would have made a tunnel fully six feet deep in such a place. The chamber, which was a very large one, was raised high above the entrance, the latter being fully eight inches below it. The nest was a mass of malodorous fish-bones, some of which were of considerable size, and had probably belonged to fish nearly six inches long. It was hollow in the middle, the material of the nest being raised some way up the wall of the chamber on three sides. The eggs were four in number, white and round and of great size.

"The Cacharis tell me that, as a rule, it only lays two or three eggs, commencing to breed in May, but that this depends a good deal on the rains being early or late as they may happen to break. The nest taken by me was found late in July, and the eggs were very hard-set. The river, in the bank of which the nest was, was large enough to admit of small boats navigating it all the year round.

"This bird is exceedingly common on all large hill-streams up to a height of about 2000 feet; above that it is not often met with, though on one or two occasions I have seen it flying about small streams at a height of nearly 4000 feet. I think that it ascends during the breeding-season higher than at other times, for in the cold weather it is fairly common in the plains of Cachar; but during the three rainy seasons I have been on a visit to that district I have only seen one bird.

"They appear to be entirely fish-eaters, and are never seen away from water.

"Whilst waiting for fish they perch very low down amongst the scrubby bushing overhanging the edge of the water, and instead of selecting a twig or bough on the outside of the bush, they get as far inside as possible; their love of shade and darkness of course leads them in like manner to always keep the shady side of the stream. They are generally found in pairs and keep within hail of one another. When frightened they fly but a short

distance, speedily resettling, unless the banks are very bare, when they continue their flight to the nearest convenient clump of shrubs. Their manner of taking prey from the water is by swooping down obliquely towards it, continuing their flight and not returning to their original perch. Occasionally they hover in the air when they are attracted by something in the water, and drop almost perpendicularly into it; in such cases, however, they never dive to any depth, seldom immersing more than their head and neck.

"Their usual cry is much like that of all Kingfishers, but very loud, and uttered in a very quick succession of notes. Besides this cry it gives a low hoarse croak from time to time when seated in deep shadow, and this is, I think, the common call to its mate; at all events, when two birds are fishing in company and one of them utters this sound, the other bird always answers it. It is not a noisy bird on the whole.

"Its flight is extremely strong, and it is capable of going at great speed; but when not frightened or otherwise hurried, it seems to content itself with a sort of half-power speed, and goes along very lazily, slowly flapping its wings.

"This bird is the last of the Kingfishers to retire to roost at night. I have sometimes seen it flitting about when it had become quite dusk. In flying at any distance the whole bird presents a grey appearance, merely the head appearing black from the feathers laying down close to the head. This crest can be raised by the bird at will, and when uttering the croak above mentioned it raises and depresses it two or three times with each cry.

"This bird, when it is successful in taking a fish too big to swallow at once, often has to give up its capture to *Haliaëtus fulviventer*, which is a frequenter of the same streams as it haunts itself, and which is much given to living on other people and by other people's exertions, always preferring ready-caught fish to the trouble of hunting for them itself. The eagle, on swooping down, utters a loud vibrating cry, and, on hearing this, *Ceryle* drops the fish without the slightest hesitation, and, accelerating his speed, seeks safety for himself in the nearest cover.

"As may be imagined, the shadow of any large eagle or hawk flying overhead is enough to reduce this bird to absolute silence; the other Kingfishers appear, however, not to mind at all."

***Ceryle rudis* (Linn.). The Pied Kingfisher.**

Ceryle rudis (Linn.), *Jerd. B. Ind.* i, p. 232; *Hume, Rough Draft* N. & E. no. 186.

The Pied Kingfisher breeds everywhere throughout the plains of India, and invariably, I think, in holes of banks overlooking running water, and, as a rule, in those of our larger rivers. It is

rare to find a nest anywhere except from 1 to 5 feet above the water-level of some perpendicular earthen cliff, going down straight into the water. Nine times out of ten the nest-hole can only be got at from a boat.

They lay, I know, from the latter end of January to the commencement of April; but I suspect they also lay towards the end of the rains, for Mr. R. M. Adam "found a nest, October 30th, 1866, in a cliff about 18 feet high overhanging the Junna. The hole was about 4½ feet above water-level, and ran for about 7 feet into the cliff. It contained four young birds able to fly."

The depth of the nest-hole varies according to the nature of the soil, extending to 4 or 5 feet where this is friable and sandy, and scarcely exceeding a foot in stiff clayey banks. Usually the burrow is quite horizontal and about 3 inches in diameter, and terminates in a chamber some 6 or 7 inches across, in which fish-bones and grass may be found strewed thinly about, but in which I have never seen any approach to a real nest.

Six is the greatest number of eggs I ever saw taken out of a nest, but it is quite common to meet with four or five hard-set eggs in a nest.

Mr. F. R. Blewitt remarks:—"This species breeds from February to probably the middle of April. For its nest it makes a moderately-sized circular hole, extending from 4 to 5 feet in the high clay or sand-bank of a stream or river. At the termination the hole is slightly enlarged for the better reception of the sitting birds. The eggs are simply deposited on the sand. On two occasions I witnessed the birds constructing the hole or nest; they alternately relieved each other at the work, and when tired sat together some short distance off on the opposite bank for a few minutes. On the 8th February last, near Bamah (Raepore District), in the high bank of the Mahanuddee, I found a nest with three fresh eggs, securing with them the parent birds. The length of the hole was about 5 feet. The next day I discovered another nest in the clay bank of a narrow but deep streamlet, with two fresh eggs. The length of the hole was about 3·5 feet.

"From personal experience I cannot affirm what may be the maximum number of the eggs, but last year (in, I think, March) my men found six young birds in a nest in the bank of a small stream. Of *Alcedo bengulensis*, they found, in the Saugor District, seven unfledged young in a nest."

Mr. Brooks writes:—"I have found the nest of this bird frequently in the banks of the Tonse and Ganges. The nest is about 3 feet in the bank, and some 2 or 3 feet above the water-level, and the hole by which the bird enters is about 2 inches in diameter."

Colonel G. Marshall says:—"This bird is very common in the Saharunpore District; it breeds in the usual places, holes in banks, and lays four shining white eggs. In this part of the country it breeds in March, and the young are hatched early in April.

"I imagine the young birds live with their parents some time

after they are fledged, since late in the season I have noticed six or seven of them coming out of a single hole.

"I have noticed a curious fact about this bird; it is a gregarious breeder. I have taken three sets of eggs from the same hole; the hole led to a large open sort of cavern about 3 feet across, which was plentifully strewn with grass and rubbish, and the eggs were in different corners of it."

Major Bingham remarks:—Breeds in March both at Allahabad and at Delhi."

Messrs. Davidson and Wenden, writing from the Deccan, say:—"Common. Apparently breeds at all seasons, except the very hot months."

Mr. Benjamin Aitken sends me the following note:—"At Akola, Berar, in either the end of January or the beginning of February, 1870, my brother took two out of six eggs from a Pied Kingfisher's nest in a river-bank, about two feet above the surface of the water. Although the hole was much dug away, the birds continued to sit upon the remaining four eggs, which were duly hatched, and soon after the young were fledged the parent birds took possession of another hole near the first. That bank seemed to be their regular breeding-place and was full of holes. Six eggs were again laid, and six young birds, looking exceedingly fresh and pretty, appeared in due time perched all in a row upon the top of the bank. Nearly a mile down the river there was a *bund*, and here of course it was easier to catch fish than at the nest where the water was running. So from early morning till late at night the parent birds continued making trips to get food for their young. Each little fish that was brought cost a flight to the bund and back of not much less than two miles, and the voracious fledglings seemed never to be satisfied. As soon, therefore, as the latter were able to go the distance, they were conducted to the bund, where they could be fed with less trouble to the old birds and, I don't doubt, more satisfaction to themselves. This arrangement was continued for several weeks, the whole family repairing to the bund every morning, and flying back to the nest in the evening. I regret I never took the trouble to watch whether they got into the hole to sleep, or took up their positions for the night on the rocks and bushes on the river's bank."

Colonel Legge found this species breeding in Ceylon in March. Its nest-hole was excavated in the earthy banks of the Gindurah.

Mr. Cripps writes from Furreedpore in Bengal:—"Excessively common. A very cheery bird, always on the move. Nests in holes excavated by themselves in river-banks. Length of gallery from $1\frac{1}{2}$ to 4 feet: no lining to egg-chamber. I have taken a clutch of 5 eggs (fresh) on the 26th October, 1877, and found a solitary half-grown young one in another nest, on the same date; the last nest of the season was secured on the 1st March, 1878, with two hard-set eggs and two callow young. These birds stick more to the large rivers, although there may be beels and tanks near."

Mr. J. Inglis remarks from Cachar:—"The Pied Kingfisher is very common throughout the district; it always fishes on the wing. It breeds here about March."

Mr. Oates, writing from Pegu, tells us:—"In Lower Pegu eggs may be taken during the latter half of October and first half of November. Eggs generally five."

The eggs are typically very broad ovals, at times nearly spherical; not unfrequently, however, they are curiously pointed towards one end.

When blown they are a pure china-white and have a high gloss.

In length they vary from 1.12 to 1.25 inch, and in breadth from 0.9 to 1 inch, but they average about 1.18 by 0.94 inch.

Pelargopsis gural (Pears.). *The Indian Stork-billed Kingfisher.*

Halcyon leuccephala (Gmel.), *Jour. B. Ind.* i, p. 222.

Pelargopsis gural (Pears.), *Hume, Rough Draft N. & E.* no. 127.

Mr. R. Thompson says that this species, the Indian Stork-billed Kingfisher, breeds from April to June, laying in a deep hole excavated by the birds in banks of streams and rivers. He adds:—"I found in May 1867 a nest containing five young ones. Near the inhabited nest were seven others, all deserted, and from the debris and marks left each evidently had served its turn as a breeding-place and had been discarded for a fresh one the following year. Found on all minor clear running streams of the Lower Himalayas."

Mr. W. Theobald makes the following remarks on the breeding of this bird in Monghyr:—"Lays in the fourth week of June. Eggs four in number, round, with some minor combinations; size 1.09 by 1.02 inch; colour pure white; gallery, 1 foot in depth, in a steep bank, in jungle."

Mr. J. R. Cripps writes from Assam:—"April 27th, 1880. Borbam Tea-garden, Dibrughur. Found four fresh eggs. On the borders of the tea-cultivation and alongside of heavy forest, a large dead tree had been blown down amongst the tea-bushes; there was a deal of earth clinging to the roots of this tree, and in this earth a hole had been excavated by the birds. The tunnel was 18 inches in length by 3 inches in height, and 3½ in breadth. The egg-chamber was slightly larger than the passage leading to it. Under the eggs were pieces of fish-bones, crab-shells, and the wings and heads of some kinds of hard-shelled insects. No river or tank was within half a mile of the place. On the 22nd August last, I saw another of these birds fly, with a fish in its mouth, into a hole in a dead and rotten chump tree, about 15 feet off the ground. This tree was about 100 yards from the one above mentioned and was in the garden. I had it cut down, but the wood was so decayed that the trunk went to shivers, destroying the young and all chance of measuring &c. the hole." These four eggs measure 1.18 by 1.06, 1.10 by 0.99, 1.21 by 1.08, and 1.2 by 1.08.

Herr Otto Möller, writing from Sikhim, says :—" I have only succeeded in getting two nests of this bird, which, however, is very common in the Terai ; the first, containing 3 fresh eggs, was found by my brother, Mr. F. A. Möller, in 1875 (no date). On the 5th May, 1878, one of my coolies brought me 3 fresh eggs together with the female bird, which he had dug out of the sandy bank of a stream. As I had no time to skin the bird the same night, I put her in a cage, where she during the night laid one egg more, which unfortunately got broken by her flapping. I send you these three eggs : the first three found measure 1·53 by 1·31, 1·50 by 1·28, and 1·52 by 1·28."

Colonel Legge informs us that in Ceylon this species " breeds in secluded spots, excavating a deep hole in the side of a river-bank or in the bund of a tank beneath shady trees. The nesting-time in Ceylon is during the first three or four months in the year."

The eggs of this species sent by Herr Otto Möller are large and very broad ovals, almost spherical but that towards one end they are somewhat pinched out and have a tendency to form an obtuse point there. The shell is pure white and has a considerable amount of gloss, but seems from the specimens sent to have a tendency to exhibit numerous small pimples or rugosities chiefly towards the blunter or more obtuse end.

The eggs of this species, like that of *P. burmanica*, appear to be extremely small for the size of the bird, being in fact no larger than those of *Halcyon smyrnensis*; indeed, had I not received them on good authority I should have hesitated to have accepted them as belonging to this large species. Like the eggs of the rest of the family, they are very round, pure white, and have a fine gloss.

Pelargopsis burmanica*, Sharpe. *The Burmese Stork-billed Kingfisher.

Pelargopsis burmanica, Sharpe, *Hume, Cat.* no. 127 bis.

Major C. T. Bingham writes from Tenasserim :—" I am rather diffident about writing a note on the finding of the eggs of this bird, as they were found by myself personally in a made nest in the fork of a bamboo growing near the bank of a choung, a thing contrary to the habits of all Kingfishers. Moreover, though I fired at the bird as she flew off the nest, I missed her. In my own mind there is not a ghost of a doubt that the eggs in question belong to the above species, as I had a close look at the bird, as she sat on the nest, with a pair of binoculars, at not more than 15 yards distance. The nest was, as I have already said, placed in the fork of a bamboo near water. It was a loosely constructed shallow cup of rough grass-roots, wholly unlined, at a height of about 4 feet from the ground. The eggs, three in number, are broad ovals, and glossy white in colour. They were found on the 10th April."

The eggs are very round ovals, pure white and very glossy.

They measure 1.16×1.0 , 1.13×0.99 , 1.2×0.98 . They are too small for *Coracias indica*, and *à fortiori* for *Eurystomus orientalis*, but I have not a sufficient series of eggs of *C. affinis* to assert that they might not have belonged to that species. But then *C. affinis* no more builds a nest such as Major Bingham describes, than do the ordinary run of Kingfishers. Again, *Nyctiornis athertoni*, the only other bird that I know that occurs in this locality, that could I should have thought possibly have laid these eggs, also breeds in holes in trees.

They are not pigeons' or doves' eggs—that is certain; they belong to the bee-eater, roller, or kingfisher groups, and, incredible as it may at first sight appear, I incline to believe that the eggs really are those of *P. burmanica*. No doubt some birds do at times go and sit upon other birds' nests, which they find unprotected by the real owners, but I never heard of a Kingfisher doing this, and Major Bingham could not have been mistaken in the birds, which he knows well.

The circumstance borders on the marvellous, but I think it cannot be rejected.

Major Bingham subsequently found the nest of this Kingfisher in holes of banks. He says:—"It breeds in the Thoungyeen in the latter end of February, in March, and in the beginning of April, commencing and finishing the digging of its nest-hole long before the eggs are laid.

"On the 23rd March, being encamped just on the bank of the Meplay close to its mouth, I noticed, while seated outside my tent in the afternoon, a pair of these birds going in and out of a hole in the bank opposite. On inspecting it closer, it proved to be the opening to a tunnel $1\frac{1}{2}$ inch in diameter, and going in for fully five feet, where it ended in a rounded chamber, somewhat larger than the passage, in which lay four roundish glossy white eggs. There was no lining of any kind, the eggs reposing on the bare ground.

"They measure respectively 1.19 by 1.05 , 1.17 by 1.03 , 1.18 by 1.08 , and 1.15 by 1.03 ."

The eggs are of the usual type, small perhaps for the size of the bird, being little if anything larger than those of *Halcyon emyrensis*, very broad ovals, in some specimens quite spherical, puer white and very glossy.

Subfamily DACELONINÆ.

Ceyx tridactyla (Pall.): The Three-toed Kingfisher.

Ceyx tridactyla (Pall.), *Jerd. B. Ind.* i, p. 229; *Hume, Cat.* no. 188.

Writing from north-west Ceylon Mr. H. Parker says:—"It should be noted that the eggs of this bird are quite unlike those of other Kingfishers. They have well-marked small ends and are also somewhat pointed at the other end. The shells are of very

fine texture and are excessively fragile; they have a decidedly pink appearance before being prepared, and afterwards do not assume the opaque white of other eggs. The bird breeds in dense forest or jungle far from water, in the banks of dry streamlets, the months being April, July, and August I believe, and probably also May."

A correspondent of the 'Asian,' apparently writing from the north-east part of the Empire and signing himself "Rekab," says of this species:—

"The eggs are laid in a hollow at the end of a burrow on a nest formed of a few small fish-bones, one or two leaves, and perhaps a scrap or two of moss. The chamber is rather larger for the size of the bird, and the tunnel also is larger in proportion than that made by other Kingfishers. It is wonderful the rapidity with which this tiny bird makes its burrow, when the soil is fairly soft and there are no pebbles to hinder it. I was once a spectator on such an occasion, and, seated in a boat in the middle of the river, I watched the pair of birds working for about half an hour. When I first arrived about three inches of excavation had been made, and the bird was able to throw out the sand behind it as it proceeded with its work; but, getting deeper in, it had, every two or three minutes, to work its way out backwards, pushing the loose sand out behind it. Its action in digging and in throwing out the sand behind it was exactly like that of a dog burrowing, and the force used was very considerable, and until the burrow was some six inches deep the sand flew out in a regular shower. I did not see it use its bill except to loosen the soil, all the removing being done by the feet. The birds relieved one another every eight or ten minutes.

"In the half-hour, or at the longest the forty minutes, that I was present some ten inches of hole had been prepared, and when I returned a fortnight afterwards three eggs had already been laid.

"This was the only occasion on which I have known this bird to select the bank of an open river for purposes of nidification. As a rule it breeds in nullahs or small streams running through forest.

"The eggs are four to six or even seven in number and pure white. According to my experience they, though not *pointed* like those taken by Mr. Parker in Ceylon, are less round than the eggs of *Alcedo*; they are, of course, very small.

"This lively little bird frequents both forest-streams and nullahs, and the larger and more open hill-rivers; but it generally forsakes the latter entirely during the breeding-season, from May until August.

"It is not at all a shy bird, and will allow close, if quiet, observation; but I have noticed little about it calling for particular mention. As far as I have been able to ascertain, it is entirely a fish-eater, though it may also devour water-insects, small prawns, &c. I have never seen any remains of insects in its stomach.

"Its cry is a shrill piping note uttered, whilst flying from one perch to the other, at longish intervals. I have not noticed it make any noise whilst perching. Its flight is very swift, and the changes of the appearance in its plumage are exceedingly beautiful.

"My notes give the 25th of May as the earliest date on which I have taken its eggs. Most were taken in July, and some well on into August, the 12th of that month, in 1887, being the latest I have recorded."

Halcyon smyrnensis (Linn.). *The White-breasted Kingfisher.*

Halcyon fuscus (Bodd.), *Jerd. B. Ind.* i, p. 224.

Halcyon smyrnensis (Linn.), *Hume, Rough Draft N. & E.* no. 120.

The White-breasted Kingfisher breeds all over the country from March to July. It lays from four to seven eggs, five being the normal number, in a hole which it excavates for itself, and which varies in length from little over 1 to more than 3 feet, although, as a rule, it does not exceed a couple. This hole is from $2\frac{1}{2}$ to 3 inches in diameter, and terminates in a chamber some 4 inches in height and 8 in diameter. I have never found any nest, so to speak, but both the passage and chamber often contain remains of frogs, mole-crickets, and the like.

The nest-holes are commonly pierced in banks of tanks and canals, or streams, or pretty high up in cliffs overlooking rivers, but the interior of wells is not at all an uncommon situation, and in Rajpootana I had six eggs brought up to me from a nest-hole situated nearly 100 feet below the surface of the country! The reason for the birds going to such an extraordinary depth appeared to be that the upper 90 odd feet passed through very loose soil, where the well was lined with masonry, and it had to go below this to pierce a hole. I have also taken the nest (and here the hole was barely 18 inches deep) out of the mud bastion of an old native fort, some 20 feet above the level of the water in the moat, and again in an old mud wall of a deserted house far away in the jungle.

Mr. W. Theobald makes the following remarks on the breeding of this bird in Mergui:—"Lays in the fourth week of March: eggs five in number; blunt oval; size 1.20 by 1.03 inch; colour pure white: gallery $1\frac{1}{2}$ foot, in a stiff bank near a road."

Mr. W. Blewitt writes:—"I took the eggs of this bird in the neighbourhood of Hansie on the 28th June and 4th and 18th of July. They were laid in holes excavated in the canal-bank without any lining or nest. In one nest-hole I found three, in each of the others four eggs, and one of the latter sets were fully incubated."

Colonel G. F. L. Marshall, when at Saharunpoor, sent me the following note:—"The eggs are laid in the latter half of April and the beginning of May; the young are hatched towards the end of May. Domestic arrangements are commenced early in April.

"The eggs are laid in holes in the ground. All that I have taken have been without exception out of the perpendicular banks of the canal. The hole is about 3 inches in diameter at the orifice, and generally slopes upward; it seldom goes more than two and a half feet into the bank, and often not more than 15 inches; the egg receptacle is merely a hollow in the earth where the hole terminates, and has no lining of any description; it is about 9 inches wide.

"The eggs, sometimes four, generally five, in number, are of a shining polished white without spot."

Writing from the Sambhur Lake, Mr. R. M. Adam tells us:—"The White-breasted Kingfisher is very common, and breeds in the banks of the open wells from March till June. On the 15th April, I took a nest 4 feet below the ground-level, and 3 feet deep, in which I found two fresh eggs. On the 13th June, I took another nest in which I found five eggs, all hard-set; the nest was about 18 inches deep. On the 27th June, I took a nest with four fresh eggs. The unblown eggs were pinkish with whitish streaks. In no case had the egg-cavity any lining."

Captain Burgess records that "this Kingfisher is one of the most common of its tribe in the Deccan, frequenting almost every stream and nullah. It breeds during the month of May, in holes of the banks of rivers, laying as many as seven eggs, of a beautiful pinky tinge, owing to the colour of the yolk showing through the thin delicate shell." From Ceylon Mr. Layard notes (but this, like most of his notes on nidification, requires verification) "that the nest of this species is found in decaying trees; the parent bird deposits two white eggs (axis 15 lines, diameter 13 lines), beautifully smooth and shining. I have procured eggs in the north of the island in December, in the south in April."

Writing from Sind, Colonel Butler says:—"Kurrachee, 7th May, 1877. Found a nest of the White-breasted Kingfisher containing five fresh eggs. The nest consisted of a round hole about $3\frac{1}{2}$ or 4 inches in diameter, bored in the perpendicular bank of a well about 10 feet from the level of the ground. The passage was about 2 feet in length, and terminated in a small chamber in which the eggs were deposited upon the bare ground.

"During the last ten days of July 1878, two or three nests were found by our men in holes in canal-banks in the E. Narra containing 4 or 5 fresh eggs each; also other nests later on, in August."

Major C. T. Bingham remarks:—"At Allahabad this bird was decidedly rare. At Delhi it abounds, and there only I have taken its nests, or rather eggs, for nests there are none."

Messrs. Davidson and Wenden, writing from the Deccan, say:—"Very abundant. Breeds in March and April."

Mr. F. W. Bourdillon, writing from Travancore, says:—"Common among the small patches of paddy cultivation and on the banks of the larger streams at the foot of the hills, but never ascending to any height. The female lays from 4 to 6 round white eggs, about the beginning of April, in a hole in a bank."

Colonel Legge says:—"In the west and south of Ceylon this species breeds from January till April, and in the north I have found its nest as late as July."

A correspondent of the 'Asian' writes, probably from Cachar, under the name of "Rekab":—"First of course may be mentioned the fact that it sometimes breeds, as do other Kingfishers, by making a hole in a bank as a receptacle for the eggs. Even in this case it places in the chamber at the end of the shaft a quantity of moss, neither making a nest of bones, as do some of this family, nor depositing them on a few leaves or the bare soil, as is the usual custom. It has, however, another and, at least as far as their bills are concerned, a far more general habit of building a nest for itself, which may be said to roughly resemble a large untidy edition of an English Wren's place of abode.

"The first time I found this out was by having some Kingfisher's eggs brought to me by a native, who said that he had taken them from a moss nest built amongst the overhanging roots of a tree growing at the side of a nullah. Some time after, more eggs were brought, and the description given of the nest was the same; but as on this occasion I went with the man to the nullah from which the nest was said to have been taken and we could find no trace of it, I concluded he had only been lying. The native, a Bachari, was, however, very positive in his assertions, and went away swearing at my incredulity. Within a few days—three, I think—he came back with two newly laid eggs, a quantity of moss, and a hen Kingfisher of this species alive in a basket. In this case he had found the nest imbedded in a hollow in a rock and, setting a noose for the parent bird, had, on catching it, brought it to me, together with the remnants of the nest and the two eggs. A rupee extracted a promise from him that he would leave the next nest he found untouched until I could go myself and make a personal inspection of it. Before this, however, I was fortunate enough to find one for myself whilst out shooting. I was creeping down a deep nullah, along the bottom of which a little water was trickling, and making a false step I splashed into a little pool, the noise frightening a Kingfisher, which flew from the bank close to my head, and looking up I saw the nest—a mass of moss, of a large oval in shape, wedged into a hollow between two stones, covered at the top with another, and supported underneath by a projecting root. It contained four eggs, which I took; but the nest fell to bits on being removed, and appeared to be merely a lot of moss pushed into the hollow and then roughly fashioned into a hollow oval. The next year a pair of these birds were seen to frequent a nullah running near a camping house where I was then halting. On some natives and myself searching about, one of the former discovered a nest just commenced to be built in a hollow, caused by a large oval stone, which had been previously half imbedded in the earth, falling out. Dismissing my men, I seated myself on the opposite bank about twenty-five or thirty yards off—seating myself behind a bush so that, as long as I

remained quiet, I should not be noticed, and had at the same time the nest within full view. Taking out a pair of opera-glasses, which I find most useful for this kind of work, I had not long to wait before one of the birds came back, and, after taking a good look at the nest, he went away again and returned in a few minutes with a mass of wet moss in his bill; clinging to the edge of the hole it commenced forcing this moss into that already placed at the base of the hollow, pushing it with the point and pressing it with the sides of the bill, and seeming to use all the force it was capable of. I could see no attempt at fastening the moss together or of intertwining it in any way, and this nest, when afterwards examined, proved to consist of layers of moss placed one on the top of the other. The force used in pressing the wet and muddy material together had rendered it sufficiently stable to stand the work required of it by the bird, but finally on one piece at the base being removed the whole structure at once came to pieces. Both birds worked at the nest hard for upwards of an hour, until nearly 10 A.M., when, as they seemed to have finished work for the time being, I went away. I left the camp the next day and did not return for nearly a month, when I took six eggs from the nest, two of which began to show signs of having been sat on, though the others appeared to be fresh.

"They lay from four to six or even seven eggs, which are, as usual, both white and round. The size varies very much with different individuals. When the eggs of this or of any other Kingfisher are first blown, they may be seen to have a peculiar marking, resembling what is known as the water-mark on watered white satin ribbon. This is only observable when held up to the light and it soon fades, but it is sufficient to distinguish the eggs of Kingfishers from other white round eggs, such as those of the Bee-eaters and others. The eggs are extremely hard and close in texture and are highly glossed; so close is the grain that if a drop of ink be placed on the egg and wiped off in a minute, it will be seen that none has penetrated into the shell.

"The situation chosen for the nest is more often than not in dense forest, and may be either the bank of a running stream, a ravine with deep precipitous banks, a steep hillside, or any other suitable place which can afford both protection from much sunlight and safety from interference from living things other than birds themselves.

"They breed only in the valley, never, as far as I know, ascending to any height for this purpose; 4000 feet is the highest altitude at which I have taken their nests.

"I have taken, or had brought to me, eggs on the 6th of April and on intervening dates up to the 26th of July.

"The habits of this bird are almost as peculiar as are his ways of nidification. Fish form a very minor part of his diet; a principal part of it is locusts and crickets, and this it takes by swooping down on them from some perch as if diving after fish, and seizing them from the bushes and grass, without halting in its

flight. It also captures prawns, small crabs, and water insects from stagnant pools, and I have once or twice seen it take cicadae from the trunk of a tree."

Mr. Oates records the following note from Pegu:—"April 15th. Nest with five eggs.

"June 3rd. Nest with three young birds and one addled egg. Breeds in thickly wooded ravines."

And, lastly, from Tenasserim I have the following note from Mr. J. Darling, Junior:—"March 31st. Found a nest of *Halcyon smyrnensis* with 5 eggs, slightly set, some 20 miles E. of Tavoy."

Typically, the eggs of this species, like those of its congeners, are very spherical, and one or two specimens that I possess are almost absolutely perfect spheres, but here and there a very broad oval takes the place of the sphere. The eggs of course are pure white, often more or less discoloured as incubation proceeds, and adorned, when fresh, with a beautiful gloss similar to that observable on the eggs of Rollers and Bee-eaters. Unlike the eggs of these species, however, the Kingfishers rapidly lose their gloss, and, as a rule, long before the eggs are ready to hatch off they have entirely lost that brilliantly polished appearance which distinguishes them when freshly laid. In size the eggs vary greatly: the smallest specimen in my collection is exactly the same size as Hewitson's figure of the European Bee-eater's, while the largest is but little smaller than the figure immediately below this latter of the European Roller's egg. Of course, as a rule, these eggs are smaller and rounder than those of the Indian Roller; but I have one egg taken by Colonel Marshall, R.E., with his own hands, as big as, if not bigger than, any Roller's egg,—a surprising fact, considering the relative sizes of the two birds.

In length they vary from 1.05 to 1.27 inch, and in breadth from 0.97 to 1.12 inch: but the average of forty-eight is 1.13 by 1.03 inch.

Halcyon occipitalis* (Blyth). *The Nicobar Kingfisher.

Halcyon occipitalis (Bl.), *Hume, Rough Draft N. & E. no. 132 bis.*

Mr. Davison says:—"I found the Nicobar Kingfisher (in the Nicobars of course, to which it is restricted) commencing to breed about the latter end of February; but the only egg I obtained was taken from the oviduct of a female which I shot on the 24th of February just as it was entering its nest; the egg was perfect, and would no doubt have been laid in a few minutes. I found three nests on the island of Camorta, and all of them were excavated in deserted ants' nests. These ants' nests are generally placed against the trunks of very large trees, but occasionally against those of cocoanut-palms, at heights of from 4 to 20 feet from the ground, and vary from 12 to 30 inches in diameter; being composed, as I believe, of some sort of clay, they are extremely hard and difficult to break. I had to dig out the nests

with a large clasp-knife. It is in the larger nests that the Kingfishers' nest-holes are excavated. The tunnel, about 2 or 2½ inches in diameter, is in the centre of the ants' nest, and goes in for about 6 inches, where it terminates in a chamber about 7 inches in diameter; the bottom of the chamber contains a quantity of pulverized earth. I saw the bird fly out of two of the nests, and shot the female above referred to as she was entering the third."

The egg in question is of the purest white, quite devoid of gloss (which it would probably have laid in the normal fashion instead of being obtained by a cæsarian operation), is a broad oval, somewhat pointed towards the smaller end, and measures 1·16 by 0·98 inch.

The late Mr. A. de Roepstorff furnished me with the following note:—"I got two eggs on the 13th March, 1875; the nest was in a hollow white ants' nest in a mangrove-swamp, attached to a cocoanut-tree; a female bird was caught in the nest. These nests are very common all over the place. The bird keeps dodging round and round and suddenly it disappears. A Nicobar man saw this one, ran up and stopped the hole with a cloth, and we dug out mother and eggs."

Order CORACIÆ.

Family CYPSELIDÆ.

Subfamily CYPSELINÆ.

Cypselus melba (Linn.). *The Alpine Swift*.

Cypselus melba (Linn.), *Jerd. B. Ind.* i, p. 175; *Hume, Rough Draft N. & E.* no. 98.

I have never taken the eggs of the Alpine Swift, nor do I know anything positive of its nidification within our limits. I have, however, several of their nests sent me by Miss Cockburn from near Kotagerry (Nilghiris).

They had been built against a rock more or less overhung by slabs of rock. They consist chiefly of feathers firmly cemented together with saliva, but vegetable fibre of different kinds of dry grass also formed part of the thick, coarse, felt-like mass.

Three or four nests at least appear to have been grouped together in one mass. One chamber, which is perfect, measures about 5 inches in diameter and was about 3 to 4 inches in height. The walls of the nest average about an inch in thickness, but in many places, owing to the necessary fillings-in where the more or less circular chambers meet each other there is a much greater

thickness of material; and where two chambers are nearest to each other, the partition wall rarely exceeds $\frac{1}{2}$ inch.

Later, Miss Cockburn obtained one egg from a nest on this same rock, which she kindly sent me; she did not take it herself, but I think that there is no doubt of its authenticity. It is a very long oval egg, pure white and rather glossy, and measures 1.1 by 0.73.

Messrs. Davidson and Wenden, writing of the Deccan, say:—"Permanent resident in Satara. Breeds, D. thinks, about the cliffs, and on old buildings in the fort there."

Colonel McMaster wrote many years ago:—"I saw several very fine Swifts which seemed to be this species at the old fort Gawilgarh and at Chikalda, 3700 feet, in April and May, but could not get a specimen. They appeared to be breeding about the perpendicular cliffs on which Gawilgarh is perched."

Cypselus affinis, J. E. Gray. *The Common Indian Swift.*

Cypselus affinis, Gray, *Jerd. B. Ind.* i, p. 177; *Hume, Rough Draft N. & E.* no. 100.

The Common Indian Swift breeds throughout the plains of India, and in the Himalayas up to a height of about 6000 feet. I cannot hear of its breeding at all high up on the Nilghiris, but I found it on the Aravalis breeding at the top of Taragurh and on Mount Abou.

It has at least two broods in a year, and eggs may be found any time from February to August, both months included.

It is very capricious as to its choice of a nest-site, but having once secured one to its liking, returns thither with a pertinacity that no ordinary persecution in the way of robbing and destroying nests will overcome. They breed in company; solitary nests are, as far as my experience goes, unknown; from a dozen to fifty pairs will be found nesting together; the nests either clustered together in one dense mass, as when they choose the roof of some little cave, or the interior of some old Moslem dome or Hindoo shrine, or else scattered about in little groups, in close proximity, as when they occupy a verandah, and each pair of rafters has its half-dozen nests. Perhaps, on the whole, it prefers inhabited to deserted buildings, but I have found its nest a hundred times in both.

The nests vary very much in size, shape, and material. I have taken them from between two very closely-set rafters in a railway-station, long half-tubes a foot in length, some 4 inches in external diameter, composed wholly of feathers cemented together by saliva, and scarcely $\frac{1}{2}$ inch in thickness. Two now before me are large masses, 10 by 6 and $2\frac{1}{2}$ to 3 thick, of grass, in which many feathers of doves, parrots, peafowl, sarus, duck, some little sheep's wool, and a bit or two of twine are all mingled. The bottom portions are a good deal cemented together by saliva, but the interior is by

no means hard or smooth; others again are *much* smaller, globular, and having the whole of the materials firmly agglutinated together.

In the plains they are not generally lined, but in the hills they often have a warm lining of grass and feathers.

Captain Hutton says:—"This is a very abundant species at Jeripanee, below Mussoorie, coursing and screaming through the air with great rapidity and shrillness. It does not construct a nest of mud like the Common Swallow, but attaches straw, rags, flags, and feathers, all together by a glutinous cement, beneath the roof of verandahs between the beams. The nest, although made of such frail materials, which are not interwoven like those of other nests, but simply glued together, is nevertheless exceedingly tough, and will resist a moderate poke from a stick. It is lined with feathers and straw, and the eggs much resemble those of *H. daurica*, being pure white, and of a narrow, lengthened appearance. With us it breeds in June and July, laying from two to four eggs."

Mr. James Aitken writes:—"This bird is of course abundant, and its rushing flight and shrill cry often strongly recall summer evenings at home. Its habits are indeed but a feeble copy of those of the English bird, the same circling near their nests, always screaming as they pass them, and the same assembling in numbers high in the air in the evening, though they fly low much more frequently. They breed once in February, and again during the monsoon. The nests are probably better known than those of any other Indian Swallow; they are generally built under roofs, sometimes in a crevice between the wall and the roof, but often attached to the roof itself. In the latter case the straws of which the nest is composed are so firmly agglutinated that it tears like a piece of matting; and it is generally ornamented without, as well as lined within, with feathers. Two or three long, white eggs are laid. The young, like those of the English Swift, never become perchers, but take boldly to the wing whenever they leave the nest, returning to it when fatigued until they acquire their full powers. Numbers take possession of the porches and verandahs, where these are high enough, of the cutcherries and other large buildings now erected all over the land, and fly backwards and forwards, building their nests, or tending their young, totally regardless of the crowd that may be moving below. It is no uncommon thing to see the top of an archway covered with their nests, all closely packed together, but where there is ample accommodation, as in a cutcherry verandah, each nest usually stands apart."

Dr. Scully remarks:—"The Common Indian Swift is very abundant in the valley of Nepal during about eight months of the year, but migrates to warmer regions in winter. It arrives in the valley about the first week in March, and by the 10th of that month it is found in swarms near all the towns and villages. It was noticed in the Nawakot district about the end of November. The breeding-season seems to last from April to July."

Major C. T. Bingham says:—"Breeds at Allahabad in February, March, and April, and again in July and August. And at Delhi in March, April, and August."

Colonel Butler, recording his experiences at Kurrachee and again at Mount Aboo, tells us:—"Kurrachee, March 19th, 1877. A colony of about 50 nests all stuck together inside the roof of a verandah. Every nest contained *two* eggs without an exception; and all of the eggs were too much incubated to be blown. I saw some hundreds of nests a few days later on the Oyster Rocks in the Kurrachee Harbour, and several more colonies in other parts of Kurrachee. They lay all through the hot weather and in the rains.

"Hundreds of the Common Indian Swift breed in the celebrated Dilwarra temples at Mount Aboo."

Captain Horace Terry says:—"I wonder if these birds are influenced in building by the rains, or whether the following circumstance is mere chance. Several pairs began to build in the verandah of my bungalow at Bellary, in June 1877. It had then been raining for a day or two and then suddenly ceased. The birds then left off building and disappeared; after that the rains did not set in regularly till the latter end of the following month, when the birds (presumably the same ones) returned, completed the original nest, and reared their young."

Writing from Sambur, Mr. R. M. Adam remarks:—"This Swift is very common, and builds in the old tombs and mosques. I found a *congeries* of about thirty nests in a small tomb, and these were all closely packed together; some had openings at the sides, while others had tubular-shaped necks about 2 inches long, projecting from the side of the nest. The nests were composed of pieces of straw, fine twigs, cobwebs, and fluffy feathers, all agglutinated together, with here and there some bright-coloured feather of a Parrot or Roller stuck carelessly on the outside. A nest which I detached measured from opening to end $7\frac{1}{2}$ inches, in breadth it was 4 inches, and the opening was 2 inches in diameter. The nest was oval in form, coarse and lumpy in texture externally, but comparatively smooth inside. The egg-cavity had a lining of fine feathers, and the entrance was lined with fluffy feathers. Nearly every nest contained a bird; and in some cases I found two birds."

Dr. Jerdon states that "their nests are composed of feathers, grass, straw, cotton rags, sometimes pieces of paper, agglutinated firmly together by the secreted mucus of their salivary glands, occasionally, perhaps, mixed with mud and rubbish. The inside of the nest is hard, glistening, and smooth, and feels, says Theobald, 'like coarse cardboard.' They vary much in shape; sometimes a first year's nest is open at the top; but they are usually closed, and communicating at the side; at times of moderate size, at other times very large, and communicating by a sort of tubular neck. They are very solid and heavy, and often closely packed together. They are built against the rafters or beams, under the roofs of huts

and houses, in the corners of old stone buildings, and in verandahs, either inside or outside, if there is protection from sun and rain. Various observers describe the nest as somewhat differently constructed. Burgess says that he has seen their nests crowded together under the roofs of old buildings, choultries, and temples; one nest from a rock was built of mud, lined with grass, and contained two white eggs. Layard states that in Ceylon they breed in great numbers on rocks, also under bridges, and that the nests built in clusters are composed of mud and grasses, with a small round entrance, precisely resembling those of the Martiu (*H. urbica*); the eggs, from two to four in number, pure white. Adams says that the nest is of mud, mixed with wool and feathers. In some of these cases the great weight and solidity of the nests may have led the observer to conclude that they were made of mud. The nest has generally a slight hollow in one place for the reception of the eggs, which are usually two in number, sometimes three, and pure white."

I may here add that I have seen not hundreds, but tens of thousands of these nests in all parts of Continental India; and that, like Jerdon, I never knew of this species using any mud in the construction of its nests.

Mr. G. Vidal writes from the South Konkan:—"Common throughout the seaboard. Nests found in February and April in clusters on the island fort of Suvamdurg and the rocky cliffs on the coast."

Mr. W. V. Legge, writing from Ceylon, says of the breeding of this Swift:—"The Indian Swift breeds in February and March in the south-east of Ceylon, nesting under bridges and in the roofs of outhouses. I found a large colony in the month of March, 1872, nesting under the tiles and between the rafters of the roof of the salt store at Hambantota. The nests were placed close together in some instances, and were of all shapes and sizes; they were constructed of grass and native cotton, and lined with feathers mixed with the latter material. The eggs, in most instances, were three in number."

And Colonel Legge gives March to July as the limits of the breeding-season in Ceylon.

I think three is the normal number; I have certainly far more often found three, or even two, than four eggs.

Typically, these eggs are excessively long and narrow ovals, pointed towards one end, and often somewhat pyriform in shape. They vary, however, much both in size and shape; and of specimens of my own taking, some are fully one third longer than others, while the cubic contents of one egg I have must be fully twice that of another. In colour they are of course a perfectly pure and spotless white, with commonly scarcely a trace of gloss, though occasionally a slightly glossy egg is met with. Several specimens I have are fully as long as the egg of *Cypselus apus* figured by Mr. Hewitson, but their breadth is rarely even five sevenths of the one there represented.

In length these eggs vary from 0·72 to 1 inch, and in breadth from 0·52 to 0·62 inch ; but they average 0·87 by 0·57 inch.

Cypselus batassiensis, Gray. The Palm-Swift.

Cypselus batassiensis Gray, *Jerd. B. Ind.* i, p. 180.

Cypselus palmarum, Gray, *Hume, Rough Draft N. & E.* no. 102.

The Palm-Swift breeds, I think, twice in the year ; at any rate I have myself taken the eggs in March, and again in July, and I have had them sent me in the latter part of June and early in April.

They nest solely on the “*Tar*” or toddy-tree (*Borassus flabelliformis*).

The large fan-shaped leaves of this palm get bent by the wind, and hang down so that the points of the leaves turn somewhat inwards ; and it is to the under surface of that portion of the leaf which is bent inwards that the nest is attached.

The bent portions of the leaf stand at an angle of from 40 to 70 degrees, so that the under surface becomes in fact the upper surface, and presents a sloping furrowed bank to which the nest is attached. In one of these furrows formed by the large plaits of the leaf, and always about the centre of this latter, a tiny watch-pocket shaped nest, composed of fine down of the *Argemone mexicana* and other plants, or in other cases of fine feathers cemented together by the saliva of the bird, is firmly glued. The actual pocket of the nest is rarely above $1\frac{1}{2}$ inch in circumference and $\frac{3}{4}$ of an inch in depth, but the back portion of the nest runs up the plait from 2 to $3\frac{1}{2}$ inches. It is a curious fact, that while the rest of the nest is pretty soft, the edge of the pocket in front is matted into a sort of cord, just as in the case of the watch-pocket a piping is run round the edge. In one or two nests that I have seen, the birds have incorporated the soft petals of the white poppy (so largely grown for opium in Behar, where this species is specially abundant) with the other materials of the nest.

As a rule, only one or at most two pairs are found breeding on the same tree ; but I once saw a whole colony located in a single palm.

Three appears to be the usual complement of eggs, but Mr. R. M. Adam, from whom I first of all received the eggs and nest of this species, informs me that he has found as many as five in a single nest.

Mr. E. Thompson, writing from the Mirzapoor District on the 18th March, 1869, remarked :—“ On a toddy-palm (*Borassus flabelliformis*) I observed several nests. With some difficulty I got down one with two eggs ; one of the eggs unfortunately got broken. The nest was stuck between two ribs of the leaf of the palm, and the female bird looked as if she was sitting up against

it—so small did the nest look, and such the apparently uncomfortable attitude of the occupant.

"Near the nest was a colony of bats, *Nycticejus castaneus*. I killed out of the lot in one shot twenty-one bats. The palm was alive with them and with the Swifts. I noticed these birds clustering on the leaf of the palm between the ribs of the fronds. When moving up and down, they crawled with a shuffling kind of motion, as if their legs were too short for progression."

Mr. W. Theobald again has the following on the breeding of this bird in Monghyr and Prome*:—"Lays in the third week of June and in July. Eggs, three in number, long pyriform; size, 0·80 inch by 0·45 inch; colour pure white. Nest of vegetable down, with a few feathers, agglutinated with mucus to the frond of the *Borassus*."

Major Bingham writes:—"I have only found it breeding at Allahabad in March, April, and May, and again in July and August. The little nests are made of agglutinated feathers in shape like a little watch-pocket, and stuck against the underside of such leaves of the toddy-palm as have been bent down by the wind. The usual number of eggs is three, but I have found four."

Mr. James Aitken makes the following remarks:—"Palm trees are scarce in Berar, but wherever a solitary one rears its head there may be found the Palm-Swift flying round and round it. I once, and once only, saw several of these birds flying about a grove of mango trees where there was not a palm tree within miles."

Writing of the South Konkan Mr. G. Vidal says:—"Seen in large numbers at Málvan and Vengorla. I only know at present of two Palmyra palms (*Borassus flabelliformis*) in the whole district, one at Bankot and one at Málvan. At Bankot, in April, I saw a pair of these Swifts flying out of the solitary Palmyra, but found no nests. At Málvan, in January and February, I saw numbers flying in and out of the leaves of the one tree there. They must have had nests, but the tree was very high, and I could get no one to climb it. There are no Palmyras at Ratnagiri, and as the species is common there about the cocoanut and betel-nut gardens, it is probable that, as Mr. Davidson noted in Mysore (*vide* S. P. vii. 172), they nest here in betel-nut, if not in cocoanut palms also. There are certainly fifty times too many birds at Málvan to find accommodation in the one Palmyra palm, though it is evidently a favourite haunt."

Mr. J. Davidson writes:—"I notice that both Dr. Jerdon and Mr. Hume state that the common Palm-Swifts (*C. batassiensis*) invariably breed on the Palmyra palm. In this district the Swift is rather common, and the Palmyra palm is very rare; indeed I have not seen more than a dozen trees altogether. On almost all of them I have found the Swift breeding, but from the number of

* Mr. Theobald here confounded the present and the next species. The former is found at Monghyr and the latter at Prome.—ED.

Swifts I have long been sure that they must breed on other trees, and to-day I took a nest on a leaf of the betel-nut palm with three fresh eggs. There were many other Swifts evidently breeding in the same garden. The leaves of the betel-nut palm bend down almost in the same way as the Palmyra. The nest was, however, on one of the upper leaves which was nearly horizontal."

Colonel Legge, writing of Ceylon, says:—"This species breeds from October until April, probably rearing two broods in the season, as I have found eggs and young of the same colony during both these months."

The egg, a miniature of that of *C. affinis*, is a long oval, slightly compressed towards one end. The texture of the shell is somewhat fine, but it has commonly little or no gloss. In colour it is a pure white, entirely free from spots or specks.

In length the eggs vary from 0.65 to 0.75 inch, and in breadth from 0.42 to 0.48 inch; but the average of more than fifty eggs measured was barely 0.71 by 0.46 inch.

Cypselus infumatus, Selater. *Selater's Palm-Swift.*

Cypselus infumatus, Selater, *Hume, Rough Draft N. & E.* no. 102 bis.

As yet Selater's Palm-Swift (*C. tectorum*, Jerd.) has only been found breeding in the Garo and North Cachar Hills, during the months of March, April, and May, at heights of from 2500 to 4000 feet above the sea-level, but it undoubtedly breeds all over Burma. The following note was given me by Dr. Jerdon:—"They attach their nests to the palm-leaves used by the people to roof their huts. The roofs consist of two separate layers of leaves, and it is to the upper surface of the lower layer that the nests are attached. These nests resemble closely those of *C. batassiensis*, and are tiny little shallow saucers, some 2 inches in diameter, composed of some feathery seed, with here and there a stray feather, agglutinated with saliva after the fashion of the genus."

I have never seen the eggs, but Colonel Godwin-Austen tells us that "this little Swift was numerous in the Naga villages around Asalú in March and April, and was then breeding in the roofs of the houses. A nest that I obtained was attached to the upper surface of a kind of palm-leaf, in the thatch of a house; it is a neat, very shallow, construction of fluffy grass-seed, stuck together with saliva, a feather or two intermingled with the grass. The eggs were two in number, pure white, resting against the lower side of the nest, which is just of sufficient depth to retain them, so that the parent bird can hardly be said to sit on her eggs in the nest, but rather hangs on to it in apparently a most uncomfortable position; and how the young when hatched remain with safety in the nest, it is difficult to understand, unless the power of hanging on by the claws is thus early developed."

Collocalia unicolor (Jerd.). *The Nilghiri Swiftlet.*

Collocalia nidifica (Lath.), *Jerd. B. Ind.* i, p. 182.

Collocalia unicolor (Jerd.), *Hume, Rough Draft N. & E.* no. 103.

The Nilghiri Swiftlet breeds on all the hills of Southern India and Ceylon.

Mr. Davison tells me that "there are several places on the Nilghiris where the Hill Swiftlet breeds largely; one is a large cave above the main road from Coonoor to Ooty, close to the last toll-bar, before the cantonment of Ooty is reached: another is a cave below the Hooker Chinchona Estate at Pykarra, near the footpath leading from Pykarra to Musnagoodie. The birds build in company, the nests often being placed in regular tiers one above the other, and often so close that they touch each other. The nest is never composed entirely of saliva, but always consists chiefly of a long grey thread-like lichen (so common on all trees on the Nilghiris) firmly agglutinated together with the saliva. The nest is a small shallow semi-saucer-like structure glued to the rock. The normal number of the eggs appears to be two; they are quite white, very elongated, and are nearly the same thickness at both ends. They breed in April, May, and the early part of June."

Mr. A. G. Cardew, C.S., also writing of the Nilghiris, says:—"This bird breeds at several places on the Nilghiris during May and June. The nests occur in the darkest parts of caves, generally in complete darkness, and are small but compact cup-shaped structures, strongly made of lichen which is fastened together and the nest glued to the wall by the mucous secretion of the bird. They measure about $2\frac{1}{2}$ inches by 2 and are very shallow, the egg-cavity not exceeding $1\frac{1}{2}$ inches in the largest, while in many the walls are less than an inch above the bottom of the nest. No lining of feathers is used, and the amount of inspissated mucus is very small, the structure being wholly of lichen. The number of eggs is invariably two. On visiting one of the most populous caves on the 6th May, I found 40 nests, among which three or four had young birds and an equal number were empty; every one of the remainder contained two eggs. At a later visit on the 20th of June, the number of nests was about 25, and of these the majority were already empty, three having eggs and four young birds. The eggs, which are pure glossless white, are remarkable for their slightly cylindrical shape, and measure from 0.82 to 0.94 in length, and from 0.52 to 0.55 in breadth."

Dr. Jerdon makes the following remarks:—"In 1846, I paid a visit, in company with Mr. Ward, M.S.C., to Pigeon Island, some miles out at sea to the south of Honore, which was said to be the resort of these birds. We found a large cave at one end of the island with a few of the nests, but of the second-make and inferior to the first, being mixed with feathers and extraneous matter. There were no eggs at this season (the end of December), and we did not see any of the birds to identify the species. A

native who had guided us to the cave said if we waited till 8 or 9 o'clock p.m., the birds would come. We instructed him to do so and to catch some of them in a net he had with him for the purpose. It is known to have other breeding-places on the Malabar coast, viz., the Vingorla rocks, where one hundred-weight of nests is said to be produced annually. If so, this must be the largest breeding-spot on the coast. Also the Sacrifice Rock, 20 miles south of Tellicherry; besides, I daresay, others. I visited Sacrifice Rock in March 1849. There is one cave here, which had perhaps fifty to hundred nests, and a few had eggs in them. Very few of the nests were of the first make, these being annually taken away by some Moplahs from the mainland. The birds were at this time flying about, feeding on the flies which abounded at the edge of the rock. About twenty couples, perhaps, were present, not more. I doubt if all the places I have enumerated on the western coast would contain the nests of a quarter of the number of these Swiftlets which I have seen at once in one locality; if so, where do the others breed? It has been suggested that they may nestle in inland caves; but all my enquiries have failed to discover any in India."

Mr. G. Vidal gives us the following account of a colony breeding in a cave on the sea-coast. He says:—"This species, as Jerdon says, is found at one of the group of rocks which lie between Vingorla and Mûlvan, some five or six miles from the mainland, and breeds there regularly every year. The right to collect the nests is annually sold by auction, and realizes on an average about Rs. 30. Two trips are made by the farmer—the first towards the end of February, and the second about the first week in April. The first harvest yields about 14 lbs., and the second from 28 to 42 lbs. Either the yield was overstated by Jerdon, or else the number of birds has greatly diminished since he wrote; half a hundredweight is now the maximum outturn.

"None of the nests I have ever got from the Vingorla rocks are pure white. In April 1878 I sent my shikaree, to bring nests, eggs, and birds, and he returned with specimens of all three. The birds were all *Collocalia*, and the nests all mixed with grass and feathers, the saliva being pure only where the nest is attached to the rock, and on the rim of the saucer. The nests vary a good deal in size and shape. They are very shallow, seldom deeper than half an inch, and have a diameter of about two inches. Externally the saliva, freely mixed with grass and feathers, is smooth and coagulated. Inside the cup it forms a network of fine shreds. They look at a little distance exactly like deep oyster-shells with one side flattened, the saliva, where it is smoothed down, having a pearly appearance. As this batch of nests was collected about a week after the farmer had paid his last visit to the rocks for the season, and had presumably left no nests worth taking, and as the natives, who ought to have known, persisted in saying that pure white nests were to be had at the first take, I could come to no definite conclusion about the matter. However,

in February 1880, I sent my man again to the rocks, with the farmer's people. They were there for three days, and returned on the 28th with about 12 or 14 lbs. of nests, which I examined. These nests were undoubtedly *first* nests, as not a single egg had been laid. All were quite as impure and mixed with grass and feathers as those I had got in the preceding April, when there were eggs or young birds in every nest. The farmer still held out that white nests are sometimes got. Of course it is possible that a few pairs of *C. spodiopygia* may breed in the same cave, but none of the specimens got were of this species, and I think it is highly improbable that they occur. Determined to sift the matter as closely as possible, I sent my shikaree again with the farmer's people for the April take. He spent three days on the rocks, from the 7th to 9th of April, and returned with about two dozen of the purest and comparatively whitest nests that were found on this occasion, as well as eggs and specimens of *Collocalia*. The nests were all mixed with grass and feathers precisely as before.

"The evidence, therefore, is now pretty complete, and shows conclusively that *Collocalia* does not make pure white nests in this locality. The Vengorla nests are all despatched to Goa in the first instance, but I have not yet ascertained their ultimate destination. Commercially, they must rank as a very third sort commodity. The nests I got in February were literally swarming with common bugs."

Captain Horace Terry writes:—"One day, while I was in the Pulney Hills (June 1883), a native whom I employed to collect for me brought me word that he had found some Swifts breeding in a cave. I went with him the next day, and close to the Pillar Rocks my guide showed me a large sort of hole, and intimated I was to go down it. I did not quite like the look of it; it was the sort of place where one might meet anything and with no room to pass. However, as the man absolutely refused to go first (which was odd, as he assured me he had been there the day before), I had no choice, so I went. After going through a sort of tunnel for some few yards in a downhill direction in the dark, I found myself in a good-sized cave with a high roof, and an opening (quite inaccessible from the outside) on to the face of the cliff. Here were the Swifts safe enough, but what puzzled me was how on earth the man knew they were there, as I am quite convinced he had never been down that hole before; there were no signs of footmarks in the sand, his description of the cave was quite inaccurate, and he could not possibly have seen anything of it from the outside. The cave was occupied by a large number of Swifts (*C. unicolor*) flying in and out, who had their nests near the roof of the cave, quite out of reach, and it was impossible to get at all near to any of them."

Mr. Bourdillon, writing from Travancore, says:—"The cave in which the Edible-nest Swiftlets breed is on the opposite side of the valley to this bungalow, at an elevation of about 2600 feet. It is formed by the displacement of a huge mass of rock, which, sliding

from its original bed, has left a slit in the side of the hill, blocked at one end, some 40 yards long, 30 feet high, and of an average width of about 3 feet. The mouth of the cave is much darkened with stones and shrubs, so that 10 yards from the entrance, without a light of some sort, one gets a very hazy idea of the surroundings. We had a candle, and after going the whole length of the cave we set to work counting the nests of the Swifts. This was no easy job; however, with a little trouble we made out that there were fully 250 nests in the cave, of which two in every three were occupied by eggs or young. While all this was going on, the old birds were in a great state of excitement, and occasionally one, more courageous than the rest, would dash at the candle and, putting it out, leave us to grope about for the matches. We took three or four nests, and altogether a dozen eggs. Of these two only were hard-set, the rest being perfectly fresh; and as we took only solitary eggs, it would appear that this Swift occasionally lays but one egg, though far more frequently two, and never, I believe, more. As I hope my brother will send you specimens of eggs and nests, I need only say in passing that the nests are pretty solid cups with a shallow cavity, composed principally of moss and the feathers of the bird, cemented to the rock and neatly lined with threads of the peculiar isinglass-like substance excreted by the bird. The eggs are pure white, smooth, and slightly glossy; and of those taken the measurements ranged from 0·81 to 0·91 in length, and from 0·52 to 0·59 inch in breadth, averaging 0·85 by 0·55.

"This accomplished, we had to secure some of the old birds. After expending all our small stock of cartridges we had only two birds to show, and these on dissection proved to be males. One bird was evidently in the breeding-stage and the other not; and I may here note that the breeding one had a very highly-developed gland beneath the chin, containing a sticky creamy substance, which was no doubt the same as that used to fasten the nest to the rock; this bird also, when shot, had a piece of moss in its *claws*, so that one may fairly conjecture it was still building. The other bird had no trace of the gland, at least so far as I could make out without the aid of a microscope. My brother will also send you with the nests and eggs a sample of the guano which was thickly spread over the floor and walls of the cave. This appears to be composed principally of the undigested portions of the birds' food, with some proportion of soluble ammoniacal matter, which has a rather disagreeable smell."

Colonel Legge thus describes the breeding-habits of this Swift in Ceylon:—"The breeding-season of this little Swiftlet in Ceylon lasts from March until June. It nests in large colonies in various caves in the hills and mountains of the central and southern parts of the island. Many of these are known from seeing the birds haunt the vicinity of certain precipitous hills; but few have been visited and examined on account of the general inaccessibility of these resorts. Among those which are known are two situated on

the rocky hills of Diagallagoolawa, near Pittegalla, on the banks of the Bemtota river, and which are referred to by Layard; several occupied by large and small colonies on the Dambettenne and Piteratmalie estates on the south face of the Haputale range; one on Pedrotallagalla, spoken of by Kelaart; and another which I am informed of in a hill called Maha-ellagala, near the 'Haycock' Mountain, as also another in the Nitre-cave district. Besides these there are, I believe, colonies in the 'Friars-Hood' or some of the surrounding rock-hills and in Rittagalla, the above-mentioned mountain, situated between the Central and Trincomalie Roads. The celebrated cave in the Haputale range, and the only one which I have had the good fortune to visit, is situated on a bold peak standing out above and towering over the Dambattenne and adjoining estates, which form one of the finest sweeps of coffee-ground in Ceylon. . . . At a point where the great gorge suddenly commenced by a sheer precipice drooping down about 1000 feet into the lower estate, stood the fine bungalow occupied by the gentleman, Mr. Imray, who was to be our kind host for the night; and at the back of this, at the top of a rich slope of coffee, towered up a rocky buttress, in which the Swiftlets of Haputale propagate their species. In this precipice a vast boulder, about 70 feet in height and 50 in breadth, has at some period slipped away from the face of the mountain, and leans against it at an angle of about 30°, forming a lofty narrow cavern. Here about 300 pairs of birds have their nests built against the inner side of the boulder, which is convex and corresponds with the concave face of the main mass. There are no nests on this latter, down which there is doubtless a considerable amount of drainage, and the instinct of the little birds is here wonderfully displayed in rejecting the wet side of the cavern, which would seriously impair the stability of their gelatinous nests. These are placed in tiers, one above the other, about 15 feet from the guano at the bottom of the cave; in places three or four were joined together, the back part of the under nest being prolonged up to the bottom of the one above it. The little structures were by no means edible, being constructed of moss and fine tendrils, arranged in layers and cemented with the inspissated saliva of the bird, the back part attaching the nest to the rock, as well as the interior of the cup, being, however, entirely of this material. I have seen one or two nests from Pittegalla almost wholly made of this substance; but even these were mixed to a certain extent with foreign or vegetable material. The interior of these Dambettenne nests was in most cases oval, the longest diameter, which varied from 2 to 2½ inches, being parallel to the rock. In depth the egg-cup was, on the average, about 1 inch. At the date of my visit, the 22nd of May, nearly all the nests contained young, two being the average number. A series of eggs procured at another time, and which I have examined, were of various shapes, long ovals being the predominant; they were pure white, and varied from 0·81 to 0·83 inch in length by 0·51 to 0·54 in breadth. It is noteworthy that the partially-fledged young

which were procured for me on this occasion, and which I kept for the night, scrambled out on to the exterior of the nests and slept in an upright position with the bill pointing straight up. This is evidently the normal mode of roosting resorted to by this species.

"The interior of this cave, with its numbers of active tenants, presented a singular appearance. The bottom was filled with a vast deposit of liquid guano, reaching, I was informed, to a depth of 30 feet, and composed of droppings, old nests, and dead young fallen from above, the whole mingled into a loathsome mass with the water lodged in the crevice, and causing an awful stench, which would have been intolerable for a moment even, had not the hundreds of frightened little birds, as they screamed and whirled in and out of the gloomy cave with a hum like a storm in a ship's rigging, powerfully excited my interest and produced a long examination of the colony. This guano-deposit is a source of considerable profit to the estate, the hospital-manager of which informed us that he had manured 100 acres of coffee with it during that season. Besides this colony there are two smaller off-shoots on the adjoining estate, in one of which, Mr. Bligh tells me, the birds have to pass through a cloud of spray in order to gain access to their nests."

The eggs that I possess of this species, all sent from the Nilghiris, are a dull, almost wholly glossless white; as a rule slender elongated ovals, almost cylindrical, and sometimes absolutely cylindrical; at times slightly pyriform, and typically, I think, somewhat compressed just beyond the middle. They vary in length from 0.79 to 0.9 inch, and in breadth from 0.53 to 0.58 inch; but they average 0.83 by 0.54 inch.

***Collocalia linchi*, Horsf. & Moore. *Horsfield's Swiftlet*.**

Collocalia linchi, Horsf., *Hume, Rough Draft N. & E.* no. 103 bis.

Horsfield's Swiftlet breeds abundantly in both the Andamans and Nicobars.

Normally it breeds in caves; indeed, in a manuscript note given me with many others by the late lamented Colonel Tytler, I find the following:—"I may note that I was upwards of two years in the Andamans, and never either saw or heard of any species of *Collocalia* building inside of houses, sheds, or the like; these species always build inside caves immediately on the sea-shore."

But since Colonel Tytler left the Andamans, a change has come over the spirit of their dream, and at the Settlement of Port Blair they breed freely inside houses, both on Ross and Chatham Islands, the interior of the saw-mills being their most favourite haunt. There is another shed at Viper also in which they breed.

There has been some grave error in regard to the nests of this, the commonest of the Andaman and Nicobar Swiftlets; it does not make any of the edible nests. There is no mistake about this; I have

shot the birds and taken the nests out of caves, and Davison has done the same out of buildings where they had never been disturbed, and the nests are in all cases similar—somewhat shallow, flat-bottomed, half or two-thirds saucers, composed of brown moss, firmly agglutinated with saliva; only along the line of junction with the place of attachment is there a thickish film of unmixed inspissated saliva, and that is brownish and not white.

The white nests are made by *C. spodiopygia*, and probably also by *C. innominata*.

The nests of this species, *C. linchi*, vary in size, but they average about $2\frac{1}{2}$ inches across, stand out from $1\frac{1}{2}$ to $1\frac{3}{4}$ inch from the rock or wall, and are about an inch deep. They vary from $\frac{1}{8}$ to more than $\frac{1}{4}$ inch in thickness.

How often they breed I cannot say; but many of the nests which I found in a cave at the little Jolly Boy, Macpherson's Straits, contained fresh eggs on the 9th of March.

The eggs are pure white and entirely devoid of gloss; long ovals very obtuse at both ends, and some of them almost cylindrical, while others again have a pyriform tendency. The eggs vary greatly in length, viz. from 0.64 to 0.75 inch, but much less so in breadth, i.e. only from 0.42 to 0.46 inch. The average may be taken at 0.7 by 0.45 inch.

I must note here that Captain Beavan is altogether wrong in what he says (Ibis, 1867) about this species, and he must have written from hearsay, for his own observations are excessively accurate. He remarks that the nest of this species is considerably smaller and perhaps whiter than that of "*nidifica*" (? *innominata*, nobis), on which account it is more valued by the Burmese, who collect both kinds for the Chinese and Penang markets. He adds that "this species is generally abundant at Port Blair, especially between Aberdeen and Navy Bay, where every cave is full of their nests." Now, in the first place, the nests of this species are brown and mainly composed of moss, and are not, so far as I could learn, ever collected at all. In the second place, there are no caves at all between Aberdeen and Navy Bay.

Mr. Davison has watched these birds making their nests; they bring a tiny piece of moss and cling on to the roof; then for four or five minutes you see the little bird's head going backwards and forwards, and then off he flies, and you see that the piece of moss has been stuck on. They do not seem to be able to stick the moss on to white paint. One pair tried for nearly a week to make a nest on a painted ceiling of a house, and covered the carpet below with scraps of moss, but failed to get a single piece to stick; at last they gave it up as a bad job.

Later, however, they succeeded in attaching a nest to this very place. The nest was the usual half-saucer, about 3 inches across and $1\frac{1}{4}$ in depth, but composed entirely of fine rootlets just glued together here and there with the ordinary gelatine, and a pretty thick film of this occurring where the nest was joined on to the ceiling.

Sometimes four or five will come in together, and all cluster in a lump where the moss is to be stuck, and then a great twittering and skirmishing ensues, till of a sudden all but one, who is left wagging his head over the moss, disappear with a sudden dash.

Subsequently Capt. Wimberley sent me a nest with two eggs, and remarked:—"This was built on to the white-painted ceiling of my house. The little birds have been trying to get a footing there for two years. This is the first time that they have been successful." The nest is rather peculiar, a very loose basket-work of fine roots, rendered perfectly stiff and firm by inspissated saliva, which, however, has only been applied in sufficient quantities to stiffen the roots and attach them firmly together, so that only the barest film can here and there be detected, except along the line of junction with the ceiling, where the attachment has been effected with a film of pure brownish-white gelatine, if I may so term it. The nest is 3 inches wide, and projected 2 inches. The eggs are similar to those we obtained; one measured 0.71 by 0.46.

Collocalia spodiopygia (Peale). *Peale's Swiftlet*.

Collocalia spodiopygia (Peale), *Hume, Rough Draft N. & E.* no. 103 quat.

Peale's Swiftlet also breeds in several of the Andaman and Nicobar Islands.

As yet it has only been found nesting in caves, though the time may come when, like other members of the family, it may resort to buildings.

I found the eggs in a cave on Little Button Island of the Andaman Archipelago on the 21st March, but I do not know whether they have a second brood. The nest, except just at its junction with the rock (where it is brownish), is composed of the most exquisitely silvery white gelatine. Exteriorly the surface is compact and somewhat roughened in laminae; interiorly it is a network of the finest and whitest threads, reminding one of the *Euplectella*. The true nest, which is pure white, and in shape rather more than half of a shallow cup, is from 2 to 2½ inches broad, stands out from 1½ to nearly 2 inches from the wall, and varies interiorly in depth from little more than ½ to a full inch. The attachment films and foundation below the true nest, both of which are brown, vary excessively according to the site chosen for the nest; in some they are almost wanting; in others the film extends for an inch on either side beyond the nest, and the foundation below the most projecting point of the true nest may be 1½ inches in depth.

The edge of the true nest all round is blunt, like that of an ivory paper-cutter, and the sides gradually increase as they approach the bottom to the thickness of ⅜, or occasionally even ½ inch. Of course the nests vary in outline, as well as in size and depth, but

the line of the upper edge is generally more that of a horseshoe than of a segment of an oval or circle.

I found the nests capriciously dotted about, *par préférence* in the darkest corners (nowhere out of reach of the hand, for the cave is low), in places a couple of feet apart, in others a dozen clustered together within a diameter of less than this.

As a rule, each nest was separate and distinct, but in a few cases I found two and even three joined together.

Mr. W. Theobald writes to me that "this is the species that breeds at Innettoung, the Bird rocks, off the Arracan coast. I have taken their exquisite nests fresh in March."

The eggs are, as usual, pure white, more or less cylindrical in shape, devoid of gloss, and slightly larger than those of the preceding species. Two eggs measure 0·8 by 0·52 and 0·82 by 0·53.

Macropteryx coronatus (Tick.). *The Indian Crested Swift.*

Dendrochelidon coronatus (Tick.), *Jerd. B. Ind.* i, p. 185; *Hume, Rough Draft N. & E.* no. 104.

The Indian Crested Swift breeds freely, to my certain knowledge, in the Sub-Himalayan tract, below Kumaon and Gurhwal, in parts of the Mirzapur District, in the Mandla District of the Central Provinces (from which locality Mr. R. Thompson sent me an exquisite little nest), in the Nilghiris (whence also I have received its eggs), and Ceylon, and generally, I believe, throughout the warmer parts of India wherever there are extensive forests.

The breeding-season is from April to June, the place selected is the bare and therefore generally dead branch of some tall forest tree. It is almost impossible to get the egg (for they lay only one) down unbroken.

I owe a nest of this species to Mr. R. Thompson, who took it on April 6th, 1869, in the district of Mandla, Central Provinces. The nest contained a single egg, which was destroyed by the fall. The nest is a most wonderful little structure. It is a very shallow half-saucer, composed of thin flakes of bark, gummed, probably by the bird's own saliva, against the side of a tiny horizontal branch. The nest is nowhere more than $\frac{1}{8}$ inch in thickness, is at most $\frac{1}{2}$ inch deep in the deepest part, and can be exactly covered by a half-crown. The parent bird, though slender, is fully 10 inches in length, and consequently the bird when sitting across the nest and the tiny branch to which it is attached completely hides the nest, and no one would suspect that there was any nest there at all.

Mr. Thompson at the time wrote to me as follows:—" *Dendrochelidon coronata* builds a wee bit of a nest with small chips of bark, a few feathers, and all glued together with inspissated saliva. The nest is placed on the side of a horizontal branch, and is entirely filled up with the solitary, rather largish, white-oval egg. The bird looks for all the world as if she were resting on the branch,

and no amount of looking from underneath would show you that there was a nest under her. The particular nest I send you was placed in a *Boswellia thurifera* tree at about 12 feet from the ground. It is very small and saucer-like, composed of the exfoliated flakes of bark of the tree (*Boswellia thurifera*) mixed with one or two feathers, all cemented together by the inspissated saliva of the bird."

Mr. R. Thompson has recently sent me another nest and egg of this species. He says:—"This nest was found in the Ahiri forests of the Chanda District, Central Provinces, on the 7th of May last. The nest was attached to a dead branch of the *Boswellia thurifera*, at a height of about 20 feet from the ground.

"It is not in the high or deep forest that the bird breeds, but in scattered jungle, usually covering low stony hills and ridges. The nest in this particular case was in a tree quite by itself, with only a few others in the neighbourhood scattered about here and there.

"My attention was directed to the male bird, who was trying his best to dislodge a Dove from a tree near to the one on which I ultimately found the nest. I knew that there must be a nest somewhere near, and soon caught sight of the female sitting transversely across a thin dead bough, the tiny nest, glued on to the side of this branch, being as usual scarcely perceptible from below. I have seen two other nests of this Swallow in this neighbourhood each containing a tolerably well-fledged young one. The nests in these instances also were placed on *Boswellia* trees. The present nest contained the single egg now sent, and is precisely similar to the one I found in Mundla in 1869. To the best of my belief they never lay more than one egg in the nest."

The stem to which the nest was attached is about 0.8 inch in diameter, against the side of this the nest is glued, so that the upper margin of the nest is on a level with the upper surface of the branch.

The nest itself is half of a rather deep saucer 1.75 inches in diameter, and about 0.6 in depth internally. The nest is entirely composed of thin flakes of bark, cemented together by the bird's saliva, and is about an eighth of an inch in thickness.

The egg is a very elongated oval, obtuse at both ends, and with little or no gloss. It is white with a slight greyish-blue tinge, and measures 0.94 in length by 0.61 in breadth.

Captain Horace Terry was fortunate enough to secure the nest and egg of this Swift on the Pulney Hills. He says:—"I found this bird fairly common on the slopes of the Pulney Hills in 1883. One day (7th April) I went down the slopes of the Pittur Valley to see what I could get in the way of birds and eggs, and noticed several of these Swifts about, and looking up at a large tree, with no branches near the ground, and with a sort of gum oozing out in places, I saw a bird near the top at the extremity of one of the branches. I looked at it through my glasses and saw it was a Crested Swift. With some little trouble I frightened it off the tree; it took a short flight and then returned to its original position,

and then I noticed what I tooked to be its nest. Under promise of a large reward I induced a native to go up for it. It was as nasty a looking tree to climb as one could well imagine. The nest was right at the end of a dead branch near the top. However, the man being once started took a sensible view of it and went right up, but of course he could not get quite close to the nest; but by tying a bamboo under the branch, cutting it through and then drawing it in he eventually got hold of the part where the nest was. It was a tedious business, but at last he got it down, and I was very glad when I safely got hold of the nest and egg. The nest was made of a few bits of bark and feathers gummed on to the branch, and apparently, in addition to the saliva of the bird, some of the gum of the tree itself had been used.

"It was just large enough to hold the one egg, which was of a glossless white, an elongated oval, the same at both ends, and not at all like a Swift's egg. It was much incubated."

About two years ago I found a nest of this species in the Darjeeling Terai in May placed exactly as above described, but both nest and egg were smashed, and the lad who went up for them was nearly killed by the bough breaking just before he reached the nest. The egg was very long and pure white, and, as far as I could measure the fragments, nearly 1 inch in length.

I have as yet obtained only one single entire egg of this species, and this I owe to Captain Mitchell of Madras. It is in colour a pure dead spotless white, and in shape a very long almost cylindrical oval, but slightly pointed towards the lesser end.

It measures 0.85 by 0.55 inch, and is much smaller than the one I saw.

Family CAPRIMULGIDÆ.

Batrachostomus moniliger, Layard. *The South-Indian Frog-mouth.*

Batrachostomus moniliger, Blyth, *Jerd. B. Ind.* i. p. 189; *Hume, Cat.* no. 105.

Mr. Bourdillon, writing from Mynall in Travancore, gives me the following interesting account of the nidification of the South-Indian Frog-mouth:—

"The nest was brought to me one evening by a coolie who had been working in the jungle. The nest was composed of vegetable down neatly and compactly interwoven with pieces of dead leaves, fragments of bark and dry wood, and one or two pieces of lichen. In shape it is a sort of disk about $2\frac{1}{2}$ inches broad and $1\frac{1}{2}$ deep, the upper surface being slightly hollowed out.

"The young one, partially fledged, was unmistakably a Frog-mouth from the colour of his plumage and bill and huge gape. On receiving the nest I at once went with the man, and, restoring it to its original position, sat down to watch.

"The chick (I quote from my notes) was much pleased at finding himself in his old quarters, and repeatedly shook himself as if he could not at first settle down into a comfortable position; this shaking being attended with some danger, as once or twice the bird seemed within an ace of rolling out of the nest. At intervals of about ten minutes it uttered a feeble chirruping call, not unlike an Ice-bird at a distance. As darkness increased its cry was more frequent and became a single chirp. I watched till night closed in and it became pitch dark without seeing anything of the old bird, though once something which might have been either bird or bat flitted past.

"Next morning I returned some time before sunrise, and in the moonlight had a good view of one of the old birds seated on the nest. It was in a very peculiar position, more lying down than sitting, with its head well up in the air. The nest was not 15 feet from the ground in a fork of a sapling, apparently without any attempt at concealment, so that I was able to approach very close to the bird, which without moving merely opened its large eyes to stare at me. Now comes the worst part of the story. I was so anxious to secure the specimen that I determined to shoot it on the nest; accordingly I retired as far as possible and fired. The result, owing to intervening bushes, being that to my great disappointment the bird went off into the jungle hard hit and was lost. Thinking at first the bird could not possibly have escaped I searched about for it, and at the foot of the small tree where the nest was I found the remains of an egg. These I have kept and will send with the nest, as I at least have no doubt that they originally enclosed the young Frog-mouth. You will see from these fragments that the egg of the bird is probably pure white, almost round, of thin texture, and with a smooth glossless surface."

The nest of this species taken at Mynall, Travancore, by Mr. Bourdillon is very similar to that of *Batrachostomus hodgsoni*, but is smaller and thicker, slightly oval in shape, 2.6 inches in length by 2.3 in width, and a full inch in depth. Instead of moss, a few fragments of dead leaves are incorporated, but the material is chiefly a soft felt-like mass, precisely similar in texture to that used by *B. hodgsoni*, but greyish white instead of brown. It is a mere pad with a shallow depression on the outer surface, a broad groove on the lower showing where it has rested on the upper surface of a nearly horizontal bough.

Batrachostomus hodgsoni (G. R. Gray). *The Sikhim*
Frog-mouth.

Otothrix hodgsoni, G. R. Gray, *Jerd. B. Ind.* i, p. 180; Hume, *Rough Draft N. & E.* no. 106.

Mr. Hodgson figures a young bird of the Sikhim Frog-mouth seated on a broad pad-like nest of moss and lichen, placed on a horizontal bough of a tree close to its junction with the trunk. He

notes on the reverse of the plate that the female with young and nest were obtained on the 20th May, 1856, behind Darjeeling, towards the great Runjeet, at an elevation of between 3000 and 4000 feet. He adds, "young like adult, but duller hues; nest nearly flat; a soft mass of lichen and moss overlaid with a soft downy vegetable substance blended into a felt-like mass."

To Mr. Mandelli I am indebted for two nests of this species. The first was found in the neighbourhood of Namtchu in Native Sikhim on the 1st of June, and it contained two hard-set eggs, one of which was broken by the shot, and the second Mr. Mandelli most kindly sent me. The other nest was found in the same neighbourhood on the 26th May, and contained a single egg ready to hatch off. Both nests were similarly placed, on more or less bare horizontal branches of medium-sized trees at heights of about 10 feet from the ground. Both nests are precisely similar to each other, and very closely resemble Mr. Hodgson's drawing. They are small circular pads barely $3\frac{1}{2}$ inches in diameter, and at thickest about $\frac{1}{4}$ of an inch thick. The upper surface slightly hollowed into a saucer-like shape, and the lower surface hollowed out into a broad groove, the pad having manifestly rested on the upper surface of a horizontal bough 3 or 4 inches in diameter. The lower surface of the pad where it was in contact with the bough has a thin coating of moss; the whole of the rest is a compact brown felt-like mass, very soft and downy, composed entirely it appears to me of excessively fine moss rootlets, but withal as soft as the underfur of any little mammal.

The egg, strange as it may appear, is pure white; a moderately elongated oval, and almost entirely devoid of gloss. The female was shot on the nest in each case, and one of the two also sent me by Mr. Mandelli is a typical *Batrachostomus hodgsoni*. It will be seen that the egg of *Batrachostomus moniliger* is almost white.

The egg measured 1·04 by 0·76.

Of two other eggs of this species in my collection, one is a very long narrow oval, a good deal compressed towards the small end; the other egg is considerably shorter and broader; the shell is of a dull, glossless white and very thin. The eggs were found on the 2nd May, and measure 1·14 by 0·63 and 1·03 by 0·65.

Caprimulgus indicus, Lath. *The Jungle Nightjar.*

Caprimulgus indicus, Lath., *Jerd. B. Ind.* i, p. 162; *Hume, Rough Draft N. & E.* no. 107.

Widely distributed as is the Jungle Nightjar, I have very few notes to record regarding its nidification.

Colonel Butler writes:—"The Jungle Nightjar is tolerably common at Mount Aboo, and breeds upon the hill in all probability about March, April, and May, as I observed and shot young birds which had quite recently left the nest in the middle of June.

Mr. Rhodes W. Morgan, writing from South India, says:—"This Nightjar breeds in all the forests and thick brushwood jungles

of Southern India. Its monotonous note may be heard the livelong night in the breeding-season, which is in March. The eggs are generally two in number, and are placed in a slight depression in the ground under some low bush. The egg is rather a pretty one, being thickly blotched with faint lilac and reddish brown on a salmon-coloured ground. Length 0.98 inch, breadth 0.58."

Mr. C. J. W. Taylor writes from Manzeerabad in Mysore:—"Very common. Procured eggs on the 10th April, 1882. Eggs deposited on the bare ground after the grass has been burnt."

I have as yet only authentic eggs of it taken in April in the Central Provinces by Mr. F. R. Blewitt, and below Mussoorie in May by Captain Hutton. These birds lay only two eggs and make no nest, but lay in a slight depression of the ground, under some low bush.

The eggs sent me by the above-named gentlemen are indistinguishable from some of those of *C. kelaarti* sent me from the Nilghiris and from Raepore. I have never taken any eggs of this species myself and indeed I am, for the most part, dependent, so far as the eggs of the *Caprimulgidae* go, on correspondents. I have never accepted eggs unless sent me along with skins of the birds to which they were said to belong; yet, notwithstanding this, I confess that I am far from certain that no mistake has in any case occurred. In regard to the present species I may mention I have as yet only four eggs, all very much of the same type and size. They are long ovals, somewhat cylindrical, and one of them slightly pyriform. The shell is fine and has a fair amount of gloss. The ground-colour is a pale salmon-pink, in one egg slightly paler and more creamy. They are pretty thickly but irregularly blotched and streaked with pale brown; in one egg a purplish, in the others more of an olive-brown, and also with faint underlying spots and clouds of more or less pale inky purple.

They vary from 1.15 to 1.25 inch in length, and from 0.86 to 0.9 inch in breadth, the longest egg being the narrowest, and the shortest the broadest.

***Caprimulgus kelaarti*, Blyth. *The Nilghiri Nightjar*.**

Caprimulgus kelaarti, Blyth, *Jerd. B. Ind.* i, p. 183; *Hume, Rough Draft N. & E.* no. 108.

This supposed species, the so-called Nilghiri Nightjar, breeds throughout Southern India and the more wooded portions of the Central Provinces from the latter end of February to August. In the Nilghiris March seems the favourite month, in the Ghâts of the Central Provinces April, but Mr. Blewitt took them in Raepore as late as August. Mr. Davison tells me that this species "breeds on the Nilghiris in the latter end of February and the earlier part of March. There is no pretence whatever of a nest, the eggs being merely placed on some slight natural depression under a bush or tuft of grass. Occasionally a rather strange situation is chosen for the eggs; and they are laid in the centre of

some small heap of ashes produced by the *Burgas* (*Badagas*) burning weeds in their fields. The eggs are two in number, of a fine salmon-coloured ground, marbled with a purplish brown, which is very much toned down, appearing as if beneath the surface of the shell."

Miss Cockburn, writing from Kotagherry, remarks:—"This Nightjar never builds a nest, but lays her eggs (generally two in number) on the bare ground, and occasionally on a rock, where there is not the slightest appearance of anything resembling a bush to shade the bird from the scorching rays of the sun while engaged in the work of incubation. She evidently prefers heat, and for this purpose chooses very warm localities. This bird is often contented with only *one* egg, which it is supposed to have the instinct to remove to another place, if looked at frequently by man. The business of hatching is apparently left entirely to the female, as she alone is seen near the eggs. The Nightjar's eggs are found in the months of February, March, and April. Some of them are perfectly oval, others are thicker at one end than the other. I know of no bird's eggs whose colours fade so very much if kept after being blown. When first taken, the prevailing hue is a beautiful salmon colour with large blotches of a darker shade; but in a short time they lose their freshness."

Mr. R. Thompson says:—"This Nightjar is found over all the well-wooded Ghâts of the Central Provinces. I found the eggs in April, two in each case, laid on the bare ground under a bush; the hen when flushed usually flew straight up into a tree. The eggs were fleshy white, blotched with purplish-pink spots. Although a good deal smaller, they were of the same shape as those of (*C. albinotatus*)."

I am indebted to Mr. F. Bourdillon for an egg of this species, taken on the Assamboo Hills, which at the extreme south of India divide Travancore and Tinnevely. He says:—"We obtained two eggs, measuring respectively 1.12 and 1.17 by 0.87, on the 18th Feb., 1872. They rested in a slight nest of dry fern-leaves, which was placed on the ground under a rock. The bird is a very common one and goes by the name of the 'Ice-bird.' It appears about sunset and on bright moonlight nights, and may be heard at all hours until dawn. I have even heard it between 9 and 10 A.M., though what should keep it awake so late I do not know."

Mr. Rhodes W. Morgan, writing from S. India, says:—"Like the preceding species, this breeds in March. The eggs are lighter in colour, being of a pinkish buff, blotched with pale violet-brown. On one occasion I found the eggs laid on a heap of ashes. The dimensions of one in my collection are 1.11 inch in length by 0.82 in diameter across."

The breeding-season of this species in Ceylon appears to be in March and April.

Some of the eggs of this species which have been sent me from the Nilghiris by Miss Cockburn, Mr. Carter, and Mr. Davison, and likewise from Raepore by Mr. F. R. Blewitt, agree precisely with

the eggs of *C. indicus* already described, but one has a much brighter salmon-pink ground, and has both the primary purplish-brown and the secondary paler purple markings much better defined and brighter; and, again, three or four of the eggs have more of a creamy tinge on the ground-colour, and have both the brown and the pale purple markings very faint and cloudy. As regards size, shape, and gloss, these eggs are much the same all through. I do not myself believe that *C. kelaarti*, as obtained in Southern India at any rate, and *C. indicus*, are really specifically distinct: and hence I am not surprised to find that the eggs attributed to both races are practically identical.

The eggs, of which I have a large series, vary from 1.08 to 1.23 inch in length, and from 0.8 to 0.9 inch in breadth; but the average is 1.15 by 0.86 inch.

Caprimulgus albinotatus, Tick. *The Large Bengal Nightjar.*

Caprimulgus albinotatus, Tick., *Jerd. B. Ind.* i, p. 104; *Hume, Rough Draft N. & E.* no. 100.

The Large Bengal Nightjar breeds from March to May pretty well all over the better-wooded portions of Continental India, but most plentifully in the low warm valleys of the Sub-Himalayan ranges.

Like the rest of the family it makes no nest, and lays two eggs upon the bare ground, as a rule in some sheltered situation.

Mr. R. Thompson writes:—"The birds begin pairing as early as March, when they are very noisy and restless, flitting about from place to place, attracted by each new call of a rival bird of either sex, a call which may be either one of love or defiance."

"The eggs, always two in number, and of a salmon-colour, blotched with pink and brown, are laid on the bare ground under shelter of a bush, stump, or stone.

"The eggs are long, almost cylindrical, both ends being of the same size. About the end of May the young birds are hatched, covered with down, and are quite helpless and unable to shift their position until able to fly—a power which is quickly given them, the rapidity of their growth being commensurate with their utterly helpless and exposed condition whilst nestling on the bare ground.

"This and *C. asiaticus* are common to all the lower warm valleys of the Sub-Himalayas. I have found sometimes three and four nests within a small space of jungle (often the dry bed of a water-course), the shelter of a high bank, or in a coppice of young trees. Though quarrelsome and restless when pairing, after that they appear to sober down and many live together in near proximity. They show a peculiar fondness for certain localities, where large numbers will be found, whilst in other places, quite as favourable as it would appear to us, not a bird will be met with."

Colonel Tickell, who seems to have possessed the remarkable faculty not shared by ordinary mortals of discriminating the sexes

of eggs, said long ago of this species:—"Makes no nest; eggs laid on the bare ground in bush-jungle; in general two; shape blunt, and both ends nearly equal; male egg $1\frac{7}{8}$ by $1\frac{1}{8}$ inch, pale fleshy clay-colour, sprinkled with patches of darker brownish red; female egg $1\frac{3}{8}$ by $\frac{7}{8}$ inch, paler and redder."

"Of this species," remarks Captain Hutton, "which is a summer visitant at Mussoorie, I took two eggs, at an elevation of 5000 feet, on the 19th April, from the bare ground, beneath bushes on the side of a hill, the colour being a rich cream-white, with darker blotches of reddish brown or clay colour; of one the diameter was $1\frac{1}{4}$ by $\frac{7}{8}$ inch, the other was somewhat smaller;" and Captain Beavan tells us that "in Maunbhoom, where it is more frequently heard at night than seen, I have procured the eggs at the end of March or the beginning of April; they are as described by Captain Hutton."

The eggs of this species are, as a rule, much paler than those of any other Indian species with which I am acquainted.

Some specimens that I possess of this bird's eggs I owe to Captain Hutton, who vouches for their authenticity. They are long, slightly cylindrical ovals, apparently somewhat smaller than those of *C. europæus*. The ground-colour is a pale creamy or yellowish-stone colour, and they are streaked or blotched with very pale yellowish and purplish brown. Many of Captain Hutton's eggs have, he informs me, faded since they were collected, so that the above description may scarcely represent the colour of the fresh egg. Other specimens received from Captain Hutton and elsewhere, said to belong to this species, resemble in shape and size those already described, but the ground-colour is almost a china-white, and the markings, which resemble those of the eggs first described in character and shape, are mostly a pale lilac, intermingled with some brown, and altogether, though paler eggs, remind one very much of the European Goatsucker's egg.

These eggs, if, as I have no reason to doubt, they really belong to *C. albinotatus*, differ *in toto* from all the other Indian Goatsuckers' eggs that I have seen in their almost purely white ground, with only the faintest possible lilac tinge; they also average considerably larger than those of the foregoing species.

But the eggs are not always of this pale type. I have seen a pair taken by Captain Cock at Dhurumsala which are a beautiful delicate salmon-pink, marbled cloudily over with pale purplish brown, part of the markings appearing as if below the surface of the eggs.

Colonel G. F. L. Marshall tells me that he "found a nest of *C. albinotatus* at Bheem Tal, at an elevation of about 4000 feet above the sea. There were a good many of the birds about, keeping in some small tree-jungle on the north side of a small hill. I only found one egg (shooting the parent bird from off it, after watching for about half an hour), and it was laid on the bare ground in a little cleared spot among dead leaves at the root of a shrub and at the foot of a low bank, which, between them, completely shaded it.

The egg was a pale salmon-colour, clouded with a darker shade of the same hue; it was of the same cloudy type as eggs of *C. asiaticus*, and not boldly streaked like those of *C. uncinatus*, Hume, or *C. europæus*."

In length these eggs vary from 1.08 to 1.3 inch, and in breadth from 0.85 to 0.95 inch; but the average of a large series is 1.2 by 0.89 inch.

Caprimulgus jotaka, Temm. & Schleg. *The Japanese Nightjar.*

Caprimulgus jotaka, T. & S., *Hume*, *Cat.* no. 107 bis.

Colonel Godwin-Austen gives the following account of the nesting-place and eggs of the Japanese Nightjar in the Naga Hills:—"I shot this bird near the Umshirpi falls on the 29th May. It got up off the path and immediately settled again about 10 yards off on the open path; on again putting it up, it did the same. Captain Badgley, who was walking behind me, called out that he had found the eggs. I then put the bird up a third time, and brought her down. The eggs were laid close in under the rock on side of the path, lying on the bare ground, with no signs of anything in the way of preparation for them or the young. The two eggs are of a dull white, blotched with three shades of amber and one shade of ashy brown: in the one they are distributed pretty evenly throughout, and this is symmetrical in form, the minor axis being in the centre of the length; in the other the markings are mostly confined to the larger end and the shape is rounder. They measure 1.22 by 0.88 and 1.19 by 0.91."

Caprimulgus macrurus, Horsf. *The Malay Nightjar.*

Caprimulgus macrourus, Horsf., *Jerd. B. Ind.* i, p. 195; *Hume*, *Cat.* no. 110.

Major C. T. Bingham, writing of the nidification of this Nightjar in Tenasserim, says:—

"This is the commonest Nightjar, and, as Mr. Davison remarks (*S. F.* vol. vi, p. 58), its incessant call of tok-tok-tok is very annoying at night.

"It is common in the Thoungyeeu valley even in dense evergreen forest. On the 15th March, 1879, while tramping back to my camp pitched on the bank of the Queebawchoung, a tributary of the Mepay, I arrived about dusk at a dense bamboo-forest just above my tent. There being lots of fallen bamboos, I had to carefully pick my steps in threading my way through, and so doing all but trod on a female of the above species; she flew up, and I saw lying on the dry bamboo-leaves a couple of blunt oval eggs, pinkish stone-colour, with washed-out purple blotches, clouds, and spots of various shades.

"Both these I found slightly set, and a third one half formed in

the oviduct of the female which I shot. I mention this circumstance, as I have never found more than two eggs in any Nightjar's nest.

"Subsequently, on the 15th March, 1880, I found a second nest with two eggs precisely similar, which measured 1·16 by 0·85 and 1·23 by 0·87.

"The first two eggs measured 1·2 by 0·9 and 1·15 by 0·89.

"On the 19th April, near the foot of the Dawna Mountains, Thoungyeen side, I found two fresh eggs of this species, flushing the bird and shooting it. There was no nest, and the eggs were laid on the bare ground at the foot of a bamboo-bush. They are stony pink, dimly clouded with obscure purple blotches, and measure respectively 1·18 by 0·89 and 1·19 by 0·89."

The eggs are of the usual Nightjar shape, very regular, somewhat cylindrical ovals, with both ends precisely, or almost precisely, alike. The shell is very fine and smooth, excessively close-grained, but very thin for the size of the egg. In some specimens it has a fine gloss, in others it is much less conspicuous. The ground-colour is a delicate creamy pink, and it is everywhere rather thinly spotted, streaked, clouded, and marbled with very pale, somewhat brownish purple, and very pale subsurface-looking inky grey. Sometimes the brown has no tinge of purple in it; in some eggs the markings are pretty equally distributed; in others they are most abundant in a zone near one end all round the middle.

The eggs, of which I have now ten, measure from 1·15 to 1·29 in length, by 0·79 to 0·91 in breadth.

Caprimulgus andamanicus, Hume. *The Andaman Nightjar.*

Caprimulgus andamanicus, Hume; *Hume, Cat.* no. 110 bis.

I myself only once met with the Andaman Nightjar, of which we shot a single specimen, a male, on Jolly Boys, an island in Macpherson's Straits, at the south of the South Andaman.

Mr. Davison remarks:—"I myself never saw this species in the vicinity of Port Blair, though I frequently heard its note of tok, tok, tok, during the night; but on a small island near Stewart Sound, between North and Middle Andaman, I saw a pair of them; they rose off the ground, flew low for a few yards, and then squatted, always placing a bush or stone between them and me. I followed them about for some time, but although I got a couple of snap shots I failed to secure a specimen. At Port Mouat, on the 12th April, one of my men shot a female as she flew off her nest; the eggs, two in number, were laid at the base of a stone in a slight natural depression among the dead leaves, some distance in the jungle. I did not see or even hear the note of any *Caprimulgus* on any of the islands of the Nicobar group."

The eggs are the most beautiful Nightjars' eggs I have ever seen, and differ from those of any other Indian species with which I am acquainted. In shape they are very regular ovals; one of them only slightly cylindrical.

The ground-colour is a delicate pale salmon-pink, and they are mottled and streaked, and ornamented with zigzag and hieroglyphic-like lines of a darker and somewhat purplish pink. They measure 1.07 and 1.13 in length, and 0.85 in width.

Caprimulgus atripennis, Jerd. *The Ghât Nightjar.*

Caprimulgus atripennis, Jerd. ; *Jerd. B. Ind.* i, p. 106.

Caprimulgus spilocircus, Gray, *Hume, Rough Draft N. & E.* no. 111.

Two eggs sent me with an undoubted skin of the Ghât Nightjar, from the Nilghiris, by Miss Cockburn are more elongated ovals than those of any of the other species. They have the usual gloss, have a pale somewhat creamy-pink ground, and are very faintly streaked and mottled over almost their entire surface with the palest possible reddish-brown and purple. They are decidedly smaller than those of the preceding species, and I think quite as small, and on the whole more elongated than those of *C. asiaticus*.

They were taken on the 10th May near Kotagherry, and measure 1.13 by 0.72 inch, and 1.01 by 0.74 inch respectively.

"In the west of Ceylon," says Colonel Legge, "the Jungle Nightjar breeds during the latter part of the dry season and the commencement of the monsoon rains in April and May. It lays two eggs in a slight depression in sandy ground, beneath the shelter of a shrub; they are of a buff ground-colour, and very sparsely spotted with very dark sepia-brown, rather roundish blots."

Mr. H. Parker remarks:—"A solitary egg in my collection measures 1.12 inch by 0.81."

Caprimulgus unwini, Hume. *Unwin's Nightjar.*

Caprimulgus unwini, Hume ; *Hume, Rough Draft N. & E.* no. 111 bis.

I described this species, Unwin's Nightjar, in the 'Ibis' for 1871, p. 406. I had then only two specimens; several have since been procured in the far north-west. Colonel Marshall, writing from Murree, says:—"We found three nests of this bird on the bare ground in the valleys; the eggs are perfect ovals, greyish white, covered with differently shaded blackish blotches, being 1.15 long and 0.8 inch broad. Breeds in May, about 5000 feet up."

Lieut. H. E. Barnes, writing from Afghanistan, says:—"Not uncommon, and breeds in May, as I obtained a young bird barely able to fly about the end of that month."

The eggs of this species are as usual elongated ovals, almost always a good deal compressed towards the small end. The shells are very fine and compact, and seem always to have a fine gloss. The ground-colour appears to be typically white, and in the most characteristic form of markings the egg is pretty thickly mottled

all over with grey, and then above that more sparsely mottled with a pale sepia-brown, slightly yellowish in some specimens; but in some eggs the mottlings are so fine and indistinct that unless very closely looked into the egg appears to be of a uniform greyish-cream colour, and indeed the extent, size, and comparative feebleness of the markings vary very greatly in different specimens, but the character of the egg never varies, always a very glossy, more or less pale stone-grey egg, with in about half the eggs more or less conspicuous pale sepia marblings.

Caprimulgus asiaticus, Lath. *The Common Indian Nightjar.*

Caprimulgus asiaticus, Lath., *Jerd. B. Ind.* i, p. 197; *Hume, Rough Draft N. & E.* no. 112.

The Common Indian Nightjar, as Jerdon calls it (though I should say that it was less common than either *C. indicus* or *C. monticolus*), breeds pretty well throughout the plains of Continental India, ascending in the spring and summer the lower ranges of the Himalayas to the height of 5000 or 6000 feet. April and May are the chief breeding months, but I have taken the eggs in July, and so has Mr. F. R. Blewitt, both at Saugor and Raepore.

Mr. R. Thompson writes:—"Breed in May. They are less choice in their selection of ground for laying their eggs on. I have found their eggs, two in number, in a quite unsheltered spot in the middle of a dry pebbly nullah. At another time on a large open spot under a large tree, and sometimes at the base of a dead wall.

"The eggs are long, cylindrical, and equal at both ends. The colour a deep salmon, with bright pink blotches intermixed slightly with earthy brown. The eggs are about one-third smaller in size than those of *C. albinotatus*."

Writing from Dhurumsala, Major Cock says:—"Found a nest on the ground with two eggs; had watched the bird near the place for some days before, and one day saw it fly up near a bank in a thick dark piece of jungle. Searched about, and in a depression of the ground among some dead oak-leaves found the eggs; they were both the same shape, but varied very much in size. The bird does not remain with us during the winter, but comes up about April and departs about August; may often be seen in the evening perched on a dead bough on the top of an oak; in the daytime always found on the ground."

And he added:—"Breeds at Sitapur in March, April, May, and June, among low scrub-jungle, laying its two eggs close to the edge of some small bush or other jungle; no nest, not even a depression in the ground, is the rule in the plains. The bird sits very close and is hard to see; unless you put her up by walking over her you will not find the eggs; the eggs themselves, from their colour, would attract the eye at once were they not covered by the bird."

Colonel Butler tells us:—"Two fresh Nightjar's eggs were brought to me on the 29th July this year (1876). They were laid of course on the bare ground and in the neighbourhood of Deesa. The colour was pale pinkish cream or salmon, marked with reddish-brown irregular streaks and spots, underlaid with numerous faint blotches of dark and light inky purple or lilac. I fancy they belong to this species, as we only have two other Nightjars in this neighbourhood, *C. mahrattensis* and *C. monticolus*. The eggs, I think, are too large for the former, and the latter I do not think breeds here, as they are absent all the hot weather, and do not arrive until about the third week in July."

He subsequently added:—"Eggs obtained by me of this species subsequently leave no doubt whatever of the identity of those I got at Deesa. Mr. J. Davidson sent me two fresh eggs taken at Dhulia, Khandesh, 8th September, 1880."

Mr. J. Davidson, writing on the birds of Western Khandesh, says—"It breeds abundantly all round Dhulia in July, August, and the beginning of September."

Mr. C. J. W. Taylor informs us that he took the eggs of this species at Manzeerabad in Mysore on the 11th April.

"The breeding-season on the western side of the island," says Colonel Legge in his 'Birds of Ceylon,' "is during the first three or four months of the year."

The eggs are long, somewhat cylindrical ovals, slightly pointed towards one end, with a ground-colour varying from a pinkish stone-colour to a deep salmon-pink, blotched, clouded, spotted, and streaked with different shades of pale reddish and purplish brown, with faint underlying inky-purple clouds and spots. The eggs vary somewhat in size, but the largest are scarcely half the dimensions of those of the European Nightjar, and they average much smaller than any of our Indian Goatsuckers except *C. atripennis*. The eggs have been obtained by several of my contributors in different parts of India, and little doubt can be entertained either as to their authenticity or as to the normal type of coloration in this species being that above described. The eggs have a faint gloss. The eggs of this species are perhaps, as a rule, more brightly salmon-coloured than those of any other of our Indian species with which I am acquainted.

In length they vary from 0.98 to 1.1 inch, and in breadth from 0.73 to 0.83 inch; but the average is about 1.04 by 0.77 inch.

***Caprimulgus mahrattensis*, Sykes. *Sykes's Nightjar*.**

Caprimulgus mahrattensis, Sykes, *Jerd. B. Ind.* i, p. 197; *Hume, Cat.* no. 113.

Colonel Butler writes regarding this species:—"Mr. Doig found two nests in the E. Narra, Sind, on the 2nd May, 1878, containing fresh eggs. On revisiting the place on the 22nd July, our men found three or four more nests containing fresh eggs. The nest

simply consists of a slight depression in the ground, usually in low thick tamarisk-jungle on *kulher* (salt) ground. The eggs, two in number, remind one more of the eggs of *Pterocles exustus* than any other eggs I know, but the markings are of a more marbled character. The ground-colour is greyish white, blotched, or perhaps marbled would be a better word, with primary markings of greyish or greenish olive, and secondary markings of pale ink grey. Some eggs are much more distinctly marked than others, but they all fade to a certain extent after they are blown.

"Mr. Doig had fresh eggs brought to him also on the 22nd and 28th June."

Mr. Scrope Doig writes from the Eastern Narra in Sind:—"This Nightjar is the only permanent resident of the genus in these districts; *G. unwini* appears in September, as a migrant, but stays for a very short period. The eggs of *C. mahrattensis* are always two in number, of a light pale stone ground-colour, with large blotches of neutral tint; these latter fade considerably after the egg is blown. The nest, which is merely a slight hollow scraped in the ground, is nearly always situated on a bare piece of *kulher* ground, sometimes under a small bunch of grass, at others under a dry bramble, or at times right out in the open without any attempt at concealment. The size of the eggs varies from 1.1 to 1.2 in length, and from 0.75 to 0.85 in breadth, the average of twelve eggs being 1.13 in length and 0.8 in width."

He adds:—"On the 20th November, 1878, one of my men said he found a nest containing two eggs of this Nightjar, but that unfortunately, while crossing a bit of salt ground, he fell and broke them. The same man has before got me eggs of this bird, so that I conclude he really got them. It seems an unusual time for them to be breeding."

The eggs of this species are moderately elongated ovals, less cylindrical than those of many of its congeners, and more or less pointed towards the small end. The shell is extremely fine and smooth, and has a decided gloss; the ground-colour is greyish white, marbled and blotched with very pale grey or greyish lilac, and over this more or less spotted and blotched with pale sepia-brown, in some cases extremely pale and with the least possible olivaceous tinge.

The extent and intensity of these primary brown markings vary very much in every specimen; they are pale in all, but in some they are barely traceable. In some eggs the grey markings occupy the greater portion of the surface of the egg, in others the ground-colour has the faintest ivory tinge.

Numerous eggs measure from 1.08 to 1.21 in length by 0.76 to 0.85 in breadth.

Caprimulgus monticolus, Franklin. *Franklin's Nightjar.*

Caprimulgus monticolus, Frankl., Jerd. B. Ind. i, p. 198; Hume, Rough Draft N. & E. no. 114.

Franklin's Nightjar breeds from April to August, according to locality, throughout the lower ranges of the Himalayas, the Sub-Himalayan forest and jungle-tracts, and forest and hilly regions of the Central Provinces and other parts of India.

It lays normally two eggs (at times a single one, hard-set, may be met with) on the bare ground, as a rule, in some shaded spot, where it can be concealed.

The eggs are of the usual type of our Indian Nightjars, long cylindrical ovals, varying a good deal in size, but little in shape. They have a fine gloss, more so I think than our Indian Nightjars. The ground-colour is, I think, as a rule, a delicate cream-colour, slightly tinged with pink, spotted and thinly blotched with very pale purple and pale brown. I have never taken these eggs myself, and cannot, therefore, in every case be as certain as I should wish of their authenticity.

An egg, however, received from Mr. Blewitt from Raepore, differs *toto calo* from those above described, at least so far as colouring is concerned. It has a rich salmon-pink ground, richer and deeper than that of any other Goatsucker's egg that I possess, and is pretty thickly clouded and streaked with only slightly brownish red.

Dr. Jerdon says:—"I have found the eggs of this species; they are like those of *C. asiaticus*, but larger and with less of the salmon hue, more of a stone colour, and with very pale clay-brown blotches."

Lieut. H. E. Barnes, writing from Rajpootana, says:—"I found two eggs of Franklin's Nightjar on the 15th June. They were deposited on the bare ground, under the scant shelter afforded by a small tuft of grass."

Mr. Davison says:—"Close to Yeaboo (where are situated several hot mineral springs, from which the place derives its name, which signifies in Burmese 'hot-water') there is some forest similar to that which lines the road leading from Moulmein to Amherst. This forest is very scanty, being composed of moderate-sized deciduous trees, interspersed with thorny bamboos and brambly shrubs, but with little or no undergrowth; and in March, both at Yeaboo and along the Amherst road, this forest presented anything but a bright picture, most of the trees had lost their leaves, and these with large quantities of bamboo-leaves and dry and dead twigs lay scattered about; in places a surface fire had passed, leaving the ground black and burnt.

"It was in such a piece of forest that, on the 10th of March, I obtained a specimen of *Caprimulgus monticolus*, a female, which I shot off her eggs.

"There was no nest, the eggs being laid in a slight depression in the ground, at the root of a tree."

The eggs found by Mr. Davison are somewhat elongated but very perfect ovals, very obtuse at both ends. The shell is fine, and they have a fair amount of gloss. The ground-colour is a rich salmon-pink, and they are blotched, streaked, and mottled with dull red, which has a slight brownish tinge. Besides these primary markings, numerous clouds and marblings of pale inky purple or neutral tint are scattered about the egg; but in each egg they are most numerous about one end, where also the primary markings are most dense. Of these two eggs taken at the same time out of the same nest, one is more than a tenth of an inch longer than the other, though in breadth they differ only in one fiftieth of an inch.

The few eggs I have vary from 1.1 to 1.22 inch in length, and from 0.8 to 0.89 inch in breadth, but I have not a sufficient series to make sure that these limits are not exceeded.

Lyncornis cerviniceps*, Gould. *The Burmese Eared Nightjar.

Lyncornis cerviniceps, Gould, *Hume, Cat.* no. 114 bis.

Mr. W. Davison, writing from Tenasserim, says:—"On the morning of the 10th January, 1875, while passing through some thin tree-jungle, almost free from brushwood, close to the village of Malawoon, I flushed a *Lyncornis* from the foot of a large tree. The bird sat very close, not moving till I was within a couple of yards of her. On looking down at the spot from which she rose, I found one egg lying on the bare ground, without any attempt at a nest, or even depression to prevent the egg from rolling away, which it easily might have done, as the spot where it was laid was slightly raised above the surrounding level. A few of the bird's richly-marked feathers lay about the spot on which the egg lay, and a few inches all round was perfectly dry, while all the surrounding ground was quite wet with the dew of the preceding night, so that the bird must have sat on the egg the whole or greater portion of the night.

"The egg was quite fresh, so the bird probably lays more than one."

The egg of this species is, as might be expected, quite of the Nightjar type. In shape it is a long, somewhat cylindrical oval: the shell is fine and has a fair gloss, but when looked into closely exhibits a vast number of minute pores. The ground-colour is a pale delicate pinky cream-colour, and it is pretty thickly marked with large irregular blotches and splashes of very pale lilac-grey, looking much as if they lay beneath the surface of the egg.

This egg measures 1.65 by 1.18.



W. E. B. D.

WILLIAM EDWIN BROOKS.

Family CORACIIDÆ.

Coracias indica (Linn.). *The Indian Roller.*

Coracias indica (Linn.), *Jerd. B. Ind.* i, p. 214; *Hume, Rough Draft N. & E.* no. 123.

Both Layard's and Tickell's accounts of the nidification of the Indian Roller are nonsense; one says the eggs are full deep Antwerp blue; the other that they are greenish, profusely speckled with dark brown spots: of course they are really pure, glossy white. They *could not* in the first place be anything else, and I have taken scores myself, and so have Messrs. Brooks, Blewitt, Hutton, Thompson, Adam, Cock, and a dozen others, and no one ever yet saw this species lay anything but a white egg. They lay from the end of March right into July, but in Upper India the great majority of the birds lay in April and June.

They build in holes in trees, in old walls, in roofs, or under the eaves of bungalows; they sometimes make a good deal of a nest, of feathers, grass, &c., especially where the site they choose is not well closed in, but where they build in a small-mouthed hole there is usually a very scanty lining. I have found a nest in a large niche in an old wall, in which the birds had contracted the entrance with masses of tow, vegetable fibre, and old rags, but this is quite exceptional; and again I have taken the eggs from a hole in a siris-tree, in which there was not the smallest lining beyond a few fragments of decayed wood. I have never found more than five eggs in any nest, and four I take to be the normal number.

Mr. F. R. Blewitt says:—"I do not know exactly how long they continue breeding, but I have found the eggs in May, June, and a part of July. The nest is built in holes of trees and old walls of buildings; occasionally the Roller even breeds in the roofs of houses (as witnessed by me at Sultanpore). I have personally searched but two nests; the one, in the hole of a tree, had a very peculiar grain-like substance of a deep chocolate-colour, on which the eggs were deposited. The other, in a hole in an old wall, had some coarse and fine grass with feathers of sorts for the eggs to rest on.

"The regular number of eggs is four. In colour they are white, without any trace of spots, and their average length is 1·3 inch, breadth 1·1 inch. In shape they are oval."

Mr. B. M. Adam remarks that in the neighbourhood of the Sambhur Lake this species is "very common. I have taken its eggs during March, April, and May. On the 24th April I saw a pair making love near the Sambhur Fort, and on the 1st May I obtained the eggs of the same birds from a cavity in a neem-tree; one of

the eggs was a little set. Breeds in Oudh during April. On the 19th April I had five eggs brought from one nest."

Major Bingham says:—"At Allahabad the Roller breeds in April, May, and July; and at Delhi in May, June, and July. I have only twice had the luck to find eggs. Once in a hole in a wall, scantily lined with a few grass-roots and a feather or two, I took three fresh eggs on the 10th April. Secondly, from a hole that had evidently been once occupied by a Bank Mynah I took four hard-set eggs lying on the bare ground without a semblance of lining, on the 11th July."

At Lucknow Mr. G. Reid informs us this Roller is a permanent resident. "A pair of them made a nest in a hole in a neem-tree about 15 yards from the verandah of the house I live in, from which I obtained four white eggs on the 20th April."

Mr. Benjamin Aitken writes:—"You and your correspondents seem to have been very successful in getting the eggs of this bird, but I have little more than a series of disappointments to record in all my efforts to the same end. It beats the Lapwing hollow in concealing the whereabouts of its nest, and is far more aggravating from the assumed innocence of its intentions. I only once saw a Roller in Bombay, and it is not particularly common in Poona or in Madras; I did not see it on the occasions of my two visits to the hill-stations of Poorundhur and Sirgurh, and I do not think it is found at the stations on the top of the Bhore Ghat; it is, however, common enough at Enteshwur, a small hill-station four miles from Sattara, though I do not remember noticing the bird in Sattara itself. But in Berar the Roller is legion, and I am sure I could have found a mare's nest with half the time and trouble I spent in searching for a nest of this bird. There was one Roller which used to fly over our bungalow many times a day, with a great lump of food for its young. I felt certain at first of marking down this, but it was a vain confidence. I had only to show a corner of an ear out at a window or from under the verandah, and the bird would quietly turn to one side and take its perch on a tree, where it would have sat till nightfall, holding the insect in its mouth, if I had not withdrawn. But I did succeed at last. There was a tope of some seventy mango-trees standing in the middle of the plain about two miles out from the station, and in this tope, in May 1870, there could be no doubt a pair of Rollers had a nest. But the birds gave no intimation of such a thing. Every time I visited the tope, a moment or two after I got under the shade, I was met with the usual muffled cry with which these birds encourage themselves in patience, and, looking up, I could see Mrs. Roller sitting calmly on a bough as if she had never left her perch since the Flood. In vain I removed to the furthest point from which I could see her, and lay down as unconcerned as possible. The usual call every quarter of an hour was the only sign of life the Roller showed. Though I call her Mrs. Roller, I was of opinion at the time that the bird was the male; the female, I made sure, was safely ensconced in some hole, too wise to show herself by coming out. One morning, creeping into the tope even more

stealthily than usual, I heard the distinct flap of a wing just over my head, and the next moment there was the usual muffled call, and the bird was sitting on its perch. The next morning I returned in more hopeful spirits and entered the tope with my eye fixed on the tree under which I was standing, when the bird flapped its wing : in a moment out from a hole flew Mrs. Roller straight to the usual perch, and gave her call. The hole contained three eggs, and was, I should say, the same hole in which the year before a pair of *Athene brama* had their nest."

Referring to Rajpootana in general, Lieut. H. E. Barne writes:—"The Indian Roller or Blue Jay breeds during April and May in holes in trees, old walls, or under the eaves of houses. A little grass and a few feathers suffice for a nest."

Messrs. Davidson and Wenden, writing of the Deccan, say:—"Common, but does not breed." And the former gentleman informs us that this Roller breeds in the Satpuras, Akraui, Pimpaluir, and Nandurbar jungles in March and April."

Mr. G. Vidal, writing from the South Konkan, says:—"Tolerably common inland in well-wooded country, but very much less so near the coast. Breeds in March."

Mr. Rhodes W. Morgan, writing from South India, says:—"The Indian Roller breeds in March in holes of trees. The tamarind and banyan are generally chosen for this purpose. The eggs are usually two in number and of a pure and glossy white. There is no nest."

Mr. C. J. W. Taylor writes from Mysore:—"After the burning of a jungle I noticed a single bird flying round and round a partially burnt tree. On approaching I noticed that the tree had a number of holes in it, so I got up, and at the top of an arm that had broken off short I found the dead body of a female resting on two eggs. She must have either been too frightened at the immense volumes of fire and smoke that rolled round her to escape, or, perhaps, 'faithful to the last,' had voluntarily perished on her eggs."

Colonel Legge says:—"In Ceylon the Roller breeds from January until June, chiefly rearing its young about March."

Mr. J. B. Cripps remarks of this Roller at Furreedpore in Eastern Bengal:—"Common, and a permanent resident. On the 3rd March 1878, I found four fresh pure white eggs of this species. Just at the corner of a ryot's house stood an old date-tree about 20 feet high, whose top had fallen off and the heart of the tree had rotted away for about a foot in depth; in the hole thus made the birds had laid their eggs without forming any lining. I have frequently noticed this bird at the hottest time of the day descend to the ground and sit with outstretched wings in the sun, and remain so for some time."

The eggs are a very broad oval, in some instances almost spherical and, like those of the Bee-eaters, they are of the purest china-white and highly glossy. In appearance the eggs are precisely similar

to those of *C. garrula* ; but no egg in my collection is either quite as large or quite as spherical as the figure of the egg of *C. garrula* given by Hewitson.

They vary in length from 1·25 to 1·35 inch, and in breadth from 0·97 to 1·12 inch ; but I find the average of a large series of measurements to be 1·08 by 1·06 inch.

***Coracias affinis*, McClell. *The Burmese Roller*.**

Coracias affinis, McClell., *Jerd. B. Ind.* i, p. 217 ; *Hume, Cat.* no. 124.

Mr. J. Inglis writes that in Cachar this Roller, which, however, is not quite typical, is "extremely common throughout the year. Breeds during March, April, and May in the holes of trees."

Mr. Oates, writing from Pegu, says:—"The eggs, four or five in number, are laid on the bare wood at the bottom of large natural hollows in decayed branches of large trees. The holes selected are generally not less than 20 feet from the ground. The shell is pure white and excessively glossy. My eggs were taken from the 26th March to the 2nd April, and were in all cases either fresh or only slightly incubated. In size they vary from 1·26 to 1·45 in length, and from 1·07 to 1·13 in breadth. The average of 12 eggs is 1·37 by 1·09."

Writing from Tenasserim Major Bingham remarks:—"In a deserted townyah I found a nest of *Coracias affinis* on the 21st of March containing five eggs, very hard-set. They were laid in a hollow in a dead, dry, and almost rotten tree, on the bare wood. The hollow was about two feet deep, and the entrance-hole an irregular jagged aperture about 3 inches in diameter."

Unless perhaps they seem a shade smaller, the eggs of this species are precisely similar to those of its Indian congener: broad regular ovals, at times a little cylindrical, pure white, spotless and with a fine gloss. Five eggs measure from 1·25 to 1·31 in length, and from 1·05 to 1·1 in breadth.

***Coracias garrula*, Linn. *The European Roller*.**

Coracias garrula, Linn., *Jerd. B. Ind.* i, p. 218 ; *Hume, Rough Draft N. & E.* no. 125.

The European Roller, so far as I yet know, breeds (within our limits) only in Cashmere and the Peshawur Valley.

It lays from May to July, making, as a rule, a scanty nest in hollow trees, in sandy banks (specially of rivers and nullahs), and, though more rarely, occasionally in ruins.

Six is, I believe, the largest number of eggs that it lays, but, according to my collectors, four or five is the common number.

The late Captain Cock remarked:—"One of the commonest nests in Cashmere: in holes in river-banks and in hollow trees you are sure to find a pair of these Rollers breeding; they lay in May and June, either five or six eggs. I also found this bird breeding

in cliffs near Nowshera; though I did not take their eggs I could have done so, had I wanted them. They make no nest to speak of; a few dead leaves in the hole of the tree where they have laid their eggs being all the nest I have ever found.

"Breeds in the Peshawur Valley. I saw it flying about cliffs during the months of April and May, and could have taken its eggs had I been so inclined, but I had such large series taken in Cashmere that I did not care for more. I notice the eggs are larger and more glossy than the eggs of *C. indica*."

Colonel Biddulph informs us that this Roller breeds in Gilgit at 5000 feet.

The eggs that I possess, and have seen, of this species were all from Cashmere, and were long, very blunt-ended ovals, a good deal compressed towards one end. They are larger and very much more elongated than those of *Coracias indica*. They are, as a rule, pure white and glossy, freshly laid ones having often a superb gloss; but some of them, owing to differences in the texture of the shell, I fancy, appear to be slightly mottled with a greyer white.

They vary in length from 1.48 to 1.56 inch, and in breadth from 1.06 to 1.16; a dozen eggs average 1.52 by 1.1 inch.

Eurystomus orientalis (Linn.). *The Broad-billed Roller.*

Eurystomus orientalis (Linn.), *Jerd. B. Ind.* i, p. 210; *Hume, Rough Draft N. & E.* no. 126.

Mr. R. Thompson, writing from the Terai below Kumaon, says:—"In April the Broad-billed Rollers arrive, begin to breed in May, and finally leave the forests in July and August. They breed in holes in the higher branches (never less than 50 feet from the ground) of the loftiest sâl trees. They extend from the Sardah to the Ganges, but particularly abound in the Kotree Doon, where they breed in company with *Eulabes intermedia* in the dense and lofty sâl forests, to which they are strictly confined."

Mr. F. W. Bourdillon writes from Travancore:—"On March 17th I was attracted by hearing the chattering of a pair of these Rollers. On going to the spot I found them engaged in ejecting from a hole in a vedu-plâ stump (*Callenia excelsa*), about 40 feet from the ground, a pair of our Hill-Mynahs (*E. religiosa*). One of the Rollers was in the mouth of the hole, and enlarging it by tearing away with its beak the soft rotten wood. The other Roller, seated on a tree close by, was doing most of the chattering, making an occasional swoop at the Mynahs whenever they ventured too close. I watched the birds for some time until the Mynahs went off, and there and then began building in a pinney tree (*Calophyllum elatum*) within the distance of 100 yards. Ten days after I sent for some billmen, who managed to ascend by tying up sticks with strips of cane, in the way that they erect ladders to obtain the wild honey from the tallest trees in the forest. It was past six o'clock in the evening before a man reached the hole in which the birds had bred. He found not the

slightest vestige of a nest, but a few chips of rotten wood, upon which were laid the three eggs. These I found to be slightly set. While the man was climbing the tree, the birds behaved in a very ridiculous and excited manner. Seated side by side on a bough, they alternately jerked head and tail, keeping up an incessant harsh chatter, and as the crisis approached, and the man drew nearer their property, they dashed repeatedly at his head.

"After the eggs were taken the birds disappeared for about a fortnight, but returned, and I believe laid again in the same position. I did not molest them this time, wishing to get the young. Unfortunately I had to leave home, and on my return I found the birds, old and young, had disappeared."

Mr. T. Fulton Bourdillon, also writing from Travancore, says:—"April 20th, 1872. A pair of these birds built in a hole in a dead tree, and we endeavoured to get their eggs or young on the above date. But the tree was so large and slippery that the coolie could not climb it. Soon after this the birds disappeared, so the young must have been nearly full-grown at this date. They come to us about the beginning of August and leave towards the end of April, after breeding. They are not very common, but, like the Great Hornbill, almost every estate has its pair, which generally are to be found at about 1000-2000 feet above sea level."

Eggs of this species sent me from Mynall by Mr. Bourdillon closely resemble those of the Indian Roller, but are somewhat larger, though not quite so large as those of the European Roller. They are very broad ovals, pure white and faintly glossy.

The specimens I have vary in length from 1.34 to 1.42, and in breadth from 1.14 to 1.16.

Family MEROPIDÆ.

Nyctiornis athertoni (Jard. & Selby). *The Blue-bearded Bee-eater.*

Nyctiornis athertoni (J. & S.), *Jerd. B. Ind.* i, p. 211; *Hume, Rough Draft N. & E.* no. 122.

Mr. R. Thompson informs me that the Blue-bearded Bee-eater breeds in holes in trees in April and May in the Sub-Himalayan forests of the Kumaon Terai. I have never obtained or seen the eggs.

Major Bingham writes from Tenasserim:—"On the 7th March, while going up to the Sinzaway Reserve, I had to encamp at a place called Minzee for an hour, to enable my men to cook their food, and wandering about, gun in hand, I happened to light on a Blue-ruffed Bee-eater, flying out of a hole in a tree, which my Burmese peons called Ma-u. Concluding rather hastily that the bird was certain to have eggs in the hole, I shot it, but on cutting

open the hollow I found only a few chips and a feather or two. The bird had its tail in a very abraded state, and proved on dissection to be a male. Several others were shot on neighbouring trees, and as by the state of the organs of the one shot the birds were evidently breeding, it is probable I might have succeeded in finding more nests and getting their eggs had I been able to stop there a week or so."

He subsequently sent me the following note:—"I cannot positively vouch for the four eggs said to belong to this species which I have procured. The case stands thus:—On the 23rd April a Karen, named Myat-jo, in my employ, brought me four roundish, white, very glossy eggs, and the dead body of a bird of this species, which on dissection proved to be a female, evidently breeding. His story was that he watched the bird go into a hole in the sandy bank of the Meplay stream, and dug it out, catching it alive seated on the four eggs he had brought me. As the place was not more than a mile or so from where I had pitched my camp, I went off at once with him to inspect the spot. Examination of the ruined nest and further questioning of Myat-jo elicited the following:—A tunnel had been dug by the birds into the soft bank to the depth of seven or eight feet, ending in a rounded chamber. The eggs reposed on the bare ground, there being no attempt at a nest. The bird pecked vigorously at Myat-jo's hand, when from time to time he put it in to ascertain how much further he had to dig. The eggs were very hard-set, and I had much difficulty in cleaning them out. They measure 1.13 by 1.05, 1.16 by 1.02, 1.12 by 1.04, and 1.17 by 1.02."

On the whole I also am inclined to accept the eggs. There is no doubt that they are undistinguishable from the eggs of *Halcyon smyrnensis*, but there are nevertheless several reasons for believing that they may really belong to *N. athertoni*. In the first place, I have never known *Halcyon smyrnensis* bore anything like so deep a tunnel. In the second place, the female specimen of *N. athertoni*, said to have been caught on the eggs, proved to be a female that had been recently laying. It had been caught and not shot, and if he did not catch it in the hole, it is difficult to understand how the Karen could have got hold of it. In the third place, the eggs are precisely what the bird might have been expected to lay.

At the same time it must be admitted that we have hitherto had reason to suppose that this bird bred in holes of trees, and Captain Bidgham himself shot a breeding bird issuing from such a hole, and very few species of birds lay both in holes of trees and in holes in sandy banks.

The eggs of this species sent by Major Bingham are nearly round, pure white, a good deal soiled by incubation, and highly glossy. They appear to be undistinguishable from eggs of *Halcyon smyrnensis*.

***Merops viridis*, Linn. *The Green Bee-eater*.**

Merops viridis, Linn., *Jerd. B. Ind.* i, p. 205; *Hume, Rough Draft N. & E.* no. 117.

The Green Bee-eater breeds pretty well all over India and Burma, though less commonly in damp low-lying localities, such as Orissa and Eastern Bengal. It lays from three to five eggs during the latter half of March, in April, May, and even the first week of June. It breeds *par préférence* in sandy banks or cliffs, but I have found its nest in an old mud wall, and again once close to Ahmedabad in Guzerat in a perfectly level nearly barren plain. Mr. Adam, whose experience had then lain chiefly in the North-Western Provinces and Oudh, formerly remarked:—"This species breeds about the end of March, April, and May; they build in holes in the ground, generally preferring the perpendicular face of a nullah, cutting or embankment, although I have sometimes found them making use of a knoll which kept the opening of the nest above the surface water which might collect on the surrounding ground. I have often watched them digging out the earth with their bills, when they commenced their nests, and scraping it away with their claws. I have always seen them commence a fresh excavation and never known them to make use of an old hole. The opening of the nest is circular, about $1\frac{3}{4}$ inch diameter and cleanly cut. The length of the passage varies from $1\frac{1}{2}$ foot to 5 feet, and it increases in width from the entrance to the egg-cavity, which is about $3\frac{1}{2}$ inches in width. From the entrance, to the nest, the passage usually declines at an angle of about 30° . The excavation is carried on very quickly, and when a piece of stone or kunkur impedes the straight line a detour is made, and the excavation carried on until a sufficient depth is reached. The eggs are laid on the bare ground. Five is the greatest number found in one nest, but three or four are common numbers. In one or two instances the eggs taken from the same nest have presented very different degrees of incubation."

Later, writing from Sambhur after some years' residence in Rajpootana, he tells us:—"This bird commences to build here towards the end of March. Although, as a rule, it prefers to build in a bank, I have taken its nest on level ground. The nest is generally about 3 feet deep. I have seen them nearly 6 feet, and the egg-cavity is a long oval with the major axis about 5 or 6 inches; it is without any lining; the angle of the decline from the opening to the nest is about 30° . In some nests which I have dug out, a piece of kunkur or stone has caused the bird to diverge at right angles from the straight line, and then follow the same angle until a sufficient depth has been reached. I have found as many as seven eggs in one nest, although four or five is the normal number, and I have repeatedly found the young birds in the most various stages of plumage, i. e., one all but fledged, and the youngest covered with down. On several occasions I have found frogs occupying the egg-cavity of these nests."

Major C. T. Bingham writes:—"Breeds both at Allahabad and at Delhi in April and May, choosing sometimes extraordinary sites for its nest-holes. In 1873, when the musketry instruction of my regiment was being carried on during the hot weather, I observed several nest-holes of this bird in the front face of the butts of the N.I. range at Allahabad; and they (the birds) seemed utterly regardless of the bullets that every now and then came and buried themselves with a loud thud in the earth close beside them."

Colonel Butler says:—"I found a nest of this Bee-eater at Deesa on the 29th March, containing five eggs. An artificial mud-bank, about a foot high, had been made to mark the limits of the Badminton Court in the Artillery Mess compound, and it was in the bank that the eggs were deposited. The hole which the birds had excavated commenced near the bottom of the bank, and inclined gradually downwards for about four feet. In diameter for about the first $3\frac{1}{2}$ feet it was not more than two inches, but from that point it grew wider and wider, and ended in a small round chamber about six inches in diameter, and in the centre of this chamber the eggs were laid upon the bare ground and without any vestige of a nest. The cock bird invariably sat upon the Badminton net when people were not playing (and on a tree close by when the court was used), whilst the hen was sitting. I fancy this was one of the first nests of the season."

Mr. Benjamin Aitken sends me the following remarks:—"I have no notes of the nidification of this species, but I have been much struck with the way they totally disappear during the hot season, in common with the King-Crow and some Shrikes. In Poona, weeks after the last of them has been seen in cantonments, an occasional pair may be met with in some sheltered spot a few miles out.

"But with regard to the island of Bombay I have no doubt whatever that the Common Bee-eater migrates as verily as the Common Swallow or the Grey Wagtail. I have been twelve years in Bombay, and never saw so much as a feather of them from April to September. Some day in the first week of June their pleasant call is heard in all directions, and awakens associations like the call of the Cuckoo. Now they are always to be seen in the cantonments of Poona as early as the second half of May.

"In my notes I have the 6th October, 1865, and the 9th October, 1866, recorded as the days of the first appearance of the Bee-eater in Bombay in those years. The date of their disappearance in 1867 was the 14th March.

"I never saw any Bee-eater but *M. viridis* in Bombay, but my brother, Mr. E. Aitken, once saw a solitary individual of one of the larger species. He was quite positive about it, so it must have been a stray visitor."

Mr. Davison remarks:—"Dr. Jerdon, writing of this species (B. I. i, page 205) says that it does not ascend mountains, to any height at least; but the bird is very common at Kulhutti on the Nilghiris, about 5500 feet above the sea; in fact I have taken the

eggs from the roadside just above the dāk bungalow at the above-mentioned place, and I have shot the bird in the Neddivuttum Chinchona Plantations, about 6000 feet above the sea. My experience is that it ascends the hills somewhat higher than *M. quinticolor*, and certainly breeds at a higher elevation than the last-named species. With us on the Nilghiris it breeds at the same time as *M. quinticolor*—that is to say, in March and April—and in the same situations; often the nests of both species may be found side by side. I have noticed that this bird appears to lay its eggs with intervals of several days between each, for I have taken out of the nest a perfectly fresh egg, and one a good deal incubated, and I have found in another nest four young ones, the youngest apparently only a couple or three days old, and the oldest more than half-fledged. I have not found this the case with *M. quinticolor*. I, on one occasion, took six eggs from a nest of this species, but generally the number appears to be four or five. In digging out these nests, instead of finding eggs, the chamber often turns out to be occupied by mole-crickets, spiders or toads, and occasionally by snakes. In this species the tunnel varies from about 18 inches to 4 feet in depth, and the chamber is about 4 inches in diameter. The eggs are laid on the bare ground; there is no attempt at any nest."

Colonel Legge says in his 'Birds of Ceylon':—"This Bee-eater breeds in the sand-hills at Hambantota and other similar localities in Ceylon. I found the young fledged on the south-east coast in June, but did not succeed in finding any nests. The nesting-time is in April and May."

Mr. Oates writing from Pegu tells us that the breeding-season of this Bee-eater is April and May.

And from Tenasserim Major Bingham writes:—"Except in heavy forest-land this little bird is as common in Tenasserim almost as in the North-west Provinces of India. It crosses the Dawna range into the Thoungyeen valley, and is found in suitable spots all along the river. It is a permanent resident and breeds there."

The eggs—little polished alabaster balls—are alone sufficient to show how close are the affinities, despite external differences of form, between the *Meropidæ*, *Alcedinidæ*, and *Coraciidæ*. In size the eggs of the various species of these families differ no doubt, but in every other respect they seem to me identical. The eggs of *M. viridis*, like those of all its affines, are nearly spherical in shape, milky-white in hue and brilliantly glossy. They are small, I think, for the size of the bird, being considerably less than those of *Alcedo ispida*, which they closely resemble. Occasionally, a somewhat oval or pyriform egg is met with, but, as a rule, they are the most truly spherical eggs I know of.

They vary in length from 0.68 to 0.82 inch, and in breadth from 0.64 to 0.73 inch; but the average of a very large series is 0.78 by 0.7 inch.

Merops philippinus, Linn. *The Blue-tailed Bee-eater.*

Merops philippensis, Linn., *Jerd. B. Ind.* i, p. 207.

Merops philippinus, Linn., *Hume, Rough Draft N. & E.* no. 118.

The Blue-tailed Bee-eater breeds from March to June, pretty well all over Continental India, in well cultivated and open country. Like all the rest of the family, it breeds in holes in banks, and lays usually four or five eggs. The holes are rarely less than 4 feet deep, and I have known them to extend to 7 feet. In diameter they vary from 2 to 2½ inches. At the far extremity, a rounded chamber, as a rule not less than 6 inches in diameter, is hollowed out for the eggs, and at times this chamber has a thin lining of grass and feathers, which I have never yet met with in the nests of the other species.

Mr. E. C. Nunn, writing from Hoshungabad, says:—"I found nests of this species in the banks of the Nerbudda on the 1st April. They consisted of fine grass-roots and feathers loosely placed at the end of a long hole, some 2 or 3 inches in diameter and perhaps 4 feet deep, which the birds had excavated in a high earthen bank. A month later I found the nest of *M. viridis* in a very similar situation."

Colonel C. H. T. Marshall remarks:—"The nests were in large numbers, about 30 or 40 in the sides of mounds, that were old brick-kilns in the station (Lahore). They were holes dug in the earth at heights varying from 4 to 9 feet, and ran about 6 inches further in than a man's arm could reach. There was no lining to the egg-chamber, only a few feathers, nothing else. The eggs were four in number in each nest, nearly round, clear, shining, pinky-white. I found three sets of these nests. The birds lay in June and the young come out in July; the old birds were very pertinacious, hovering round my head when I was digging out the nests. There are large numbers of these birds all the hot weather about Lahore; they go away, apparently, in the cold weather, or at most very few remain."

Mr. F. B. Blewitt from Raipoor writes:—"The eggs were secured in the high sandy banks of the Mahanuddee. The holes burrowed by the birds in the somewhat loose sand of the bank were from 5 to 7 feet deep, and largely rounded out at the far end into a chamber the size of a large saucer. The eggs were laid on the bare sand. This was in May, and all were quite fresh. Five was the maximum number found in any hole. *M. viridis* here, at any rate, breeds a month earlier, since all the nests of this latter species that I examined at the same time contained young ones."

From Kumaon Mr. B. Thompson tells us that "this, too, is a common breeder in certain localities. At Nujeebabad around and about the Pethoragurh Fort numbers breed. I have seen them breed in the hot valleys of the Himalayas far in the interior. But

it is not a forest bird, keeping well out in the cultivated and open parts."

Mr. Adam says:—"Breeds in March and April. The structure of the nest is similar to that of *M. viridis*. I found them building on the bank of a small stream near Baraich, and I have also seen their nests a good distance from the stream. Four is the greatest number of eggs I have found in one nest; on two occasions I found three. On one occasion a bird-catcher brought me an egg of this bird and asked me if I quite believed in its authenticity, because if I did not he would convince me. He then produced a bird, and with a jerk of his thumb forced an egg from the bird exactly like the one he had given me."

Mr. Brooks tells me that "this bird breeds near Digheea on the Ganges, between Allahabad and Mirzapore, and about 10 miles below the junction of the Ganges and Tons Rivers. Also in the cliffs below the Government Gardens at Mirzapore close to the Dāk Bungalow. I failed to get the eggs, the holes were so deep, 6 and 7 feet I think. These birds breed in company with *Acridotheres ginginianus*."

One year I found a colony of these Bee-eaters established in a small sandy cutting at the Agra Railway Station, where the engines passed twenty times a day within 2 feet of the mouths of the holes.

Major C. T. Bingham says:—"I have found nests of this bird both at Allahabad and at Delhi. At the former place I was too late for the eggs; every nest-hole I dug out containing full-fledged youngsters, some quite able to fly—this was in the end of June. At Delhi I got their eggs in the beginning of May."

Mr. Oates, writing from Pegu, says:—"Breeds in the Irrawaddy and Sittang rivers in large colonies at the end of April. On the 25th of April last I proceeded with six men to dig out as many nests as I could in three hours. I soon found that it was not so easy as it looked. The banks of the Sittang at this place were very steep, and the entrances to the nests were situated about a foot below the top of the bank, and some distance above high water. We found that very few of the galleries were less than 5 feet long, most of them being fully 7. The gallery usually takes a couple of slight turns and is also much inclined to the horizon, so that altogether the entrance may be only one foot below the surface of the ground, the egg-chamber is as much as three or four feet. The gallery itself is $1\frac{1}{2}$ inches in diameter, very regular in section up to the egg-chamber, which is a roomy place about five inches wide, eight long, and four high. We worked hard, but dug out only 30 nests. Most of the nests contained five eggs, a few only four, and one or two only three. The majority of them were fresh, but a few, even at this early date, were nearly hatched. In no case did the female bird leave the eggs till the egg-chamber and she were exposed to view. In fact we caught several birds. The eggs are laid on the bare ground, and in no case did I find a vestige of grass or feathers."

Major Bingham writes from Tenasserim :—"This bird being partially migratory is often overlooked ; but it is common nearly all the year round at Kaukarit on the Houndraw river, where it breeds in April and May in the sandy banks of the Kaukarit choung."

The eggs are white, highly glossed, and very spherical ovals. They average considerably smaller than those of the European Bee-eater, but otherwise they are perfectly identical with these, and I fancy that it would be impossible to separate small specimens of *M. apiaster* from large ones of *M. philippinus*.

In length they vary from 0·82 to 0·97 inch, and in breadth from 0·67 to 0·85 inch ; but the average of more than fifty eggs measured was 0·88 by 0·76 inch.

Merops persicus, Pall. *The Blue-cheeked Bee-eater.*

Merops ægyptius, *Forsk.*, *Jerd. B. Ind.* i, p. 209 ; *Hume, Rough Draft N. & E.* no. 120.

Mr. Adam writes :—"The Blue-cheeked Bee-eater occurs close to Sambhur, and in the Marot hills the natives showed me the holes in which it breeds about the beginning of the rains. I have not yet obtained the eggs."

Major Bingham remarks :—"This large and handsome Bee-eater makes its appearance at Delhi, and in the districts to the south and west, in the end of April ; at first in small numbers, but about May in immense flocks. About Delhi itself they bred sparingly, chiefly in high sandy banks near the Jumna ; but at Sooltanpoor, near Gurhi Hursaroo, on the Rajpootana State Railway Line in great numbers. The breeding-season lasts from the middle of May to the middle of July, the last eggs I took being on the 9th of the latter month ; but most nests contain young by the end of June. Five is the greatest number of eggs I have found in any one nest, and this only on two occasions ; the usual number laid I think is three or four.

"The depth of the nest-holes varies from 3 to 7 feet ; in diameter they vary from 2 to 3½ inches, and the tunnel almost invariably has a slight inclination upwards, with an occasional divergence to the right or left, and ends in a chamber about 9 inches in length, 4 in breadth, and 4 in height. This is never lined, the eggs being laid on the bare ground. In such nests as I have been unlucky enough to dig out and found tenanted by young ones, I found the remains of grasshoppers, locusts, and other insects, strewing the floor of the chamber. I was glad to find that these latter nests, though ruined, were not deserted by the old birds ; but the young fed and taken care of till able to fly."

The eggs are of the usual Bee-eater type, in shape normally very broad ovals, pure white and very glossy. The shape, however, varies a good deal ; a good many eggs are almost spherical,

and again two or three I have are much elongated, one cylindrical like a Sandgrouse's egg, another like a huge Swift's.

In size they are intermediate between those of *M. philippinus* and *M. apiaster*. In length the twenty specimens I have vary from 0·87 to 1·00, and from 0·75 to 0·83 in width, but the average of this lot is 0·95 by 0·81.

Merops apiaster, Linn. *The European Bee-eater*.

Merops apiaster, Linn., *Jerd. B. Ind.* i, p. 210; *Hume, Rough Draft N. & E.* no. 121.

The European Bee-eater, so far as I am aware, breeds nowhere within our limits, save only in Cashmere. There it nests abundantly during May and June, laying from 4 to even 7 eggs; the nests are similar and similarly situated to those of the species already noticed, but they are usually in close proximity to water. The chamber is comparatively large, and at times (to judge from the sample sent me) has a good deal of feather and grass lining.

The late Captain Cock wrote:—"I did not succeed in taking this bird's eggs until a few days before leaving the valley of Cashmere. I found them breeding on the hill-side near Gunderbul in June; they were not in colonies as *M. philippinus*, but two or three nests would occur within a short distance of each other. Advantage was always taken of a steep bank or declivity in the hill-side and the nest was from three to four feet from the surface, a chamber at the end of the gallery without any lining, and containing 5 or 6 white eggs considerably larger than those of *M. philippinus*. I frequently caught the bird on the eggs, they sat so close."

Lieut. H. E. Barnes, writing from Afghanistan, says:—"The European Bee-eater is very common, especially on the hills about the end of April. I have not been able to find a nest, but I feel certain they breed somewhere about the hills. On dissecting several females at the end of May, I found the ovaries well developed, and containing eggs larger than peas. This, coupled with the fact that they are still common (July), convinces me that the birds breed here; but up to the present time not a single nest has been found, nor are any holes seen anywhere in the vicinity where the birds appear most numerous."

The eggs vary very much both in size and shape; some are not bigger than many eggs of *M. philippinus*, others are very considerably larger. Some are nearly spherical, others long, broad, obtuse-ended ovals; all are of course pure white, and most of them have a very fine gloss.

In size they vary from 0·95 to 1·13 inch in length, and from 0·87 to 0·94 inch in breadth, but they average 1·08 by 0·9 inch.

Melittophagus quinticolor (Vieill.). *The Chestnut-headed Bee-eater.*

Merops quinticolor, Vieill., *Jerd. B. Ind.* i, p. 208.

Merops swinhoei, Hume; *Hume, Rough Draft N. & E.* no. 110.

Mr. Davison gives me the following note on the nidification of the Chestnut-headed Bee-eater:—"This bird breeds on the slopes of the Nilghiris during March and April. They bore holes in the sandy parts of banks varying in depth from 3 to 6 feet; some are quite straight, others after a depth of a foot or 18 inches turn off at almost a right angle, and others again take a somewhat circular direction. The tunnel always terminates in a circular chamber, about 6 inches in diameter, which is never lined; the eggs, four to six in number, being deposited on the bare and generally somewhat damp floor of the chamber. One favourite breeding locality is the sandy portion of the banks on the Seegore Road, leading from the Nilghiris to Mysore; along 5 or 6 miles of this road the banks are drilled with innumerable holes of this species and *Merops viridis*, sometimes eight or ten together, at others scattered singly along the sandy portions of the bank. The bird sits very close, and invariably allows itself to be dug out without attempting to escape. The diameter of the tunnel of this species is somewhat larger than that of *M. viridis*; in fact, by looking at the holes (when made in a comparatively stiff soil) it is easy to tell which of them pertain to which species.

"I found these birds only commencing to make their holes about the middle of April at the Andamans, although the birds had been seen in pairs since the latter end of March."

Layard has described the breeding of this species in Ceylon, *Ann. Mag. N. H.* 1853, xii, p. 174.

Mr. W. Theobald has the following remarks on its nidification in Mergui:—"Lays in the third week of March. Eggs 5 or 6 in number, pointed oval. Size 0.84 inch by 0.79 inch, colour pure white. Gallery from 1 to 7 feet in length, in soft sandy soil near water: it enters the ground at a small angle and then runs horizontally."

I found this bird breeding at the close of April in a nullah near the Ganges in the Eastern Doon, which in those days was one vast forest. There was a colony of about a dozen pairs, and the only nest I opened was about 4 feet deep, and contained four eggs.

Mr. J. Darling, Junior, says:—"I found four nests of this bird on April 15th, 1873, at Vythery, about 2300 feet, in the soft bank of a road, containing respectively 6 hard-set eggs; 5 hard-set eggs; 3 young birds, and 3 eggs ready to hatch; 5 young birds, and one egg ready to hatch off. The hole leading in to the nest was 2 to 3 inches in diameter, and from 2 to 5 feet deep."

Colonel Legge says in the 'Birds of Ceylon':—"I found the nest of this bird on the banks of the Gindurah in the month of April."

Mr. H. Parker writes :—" *April to June.* In Ceylon this Bee-eater usually breeds in small colonies, numbering from three to ten pairs, and prefers secluded river-banks, but will nest in road-cuttings, or even under roads, or in almost level ground."

Writing from Tenasserim, Major Bingham says :—" On the 2nd April, halting for a day high up on the Oukreen choung, a feeder of the Thoungyeen river, I went roaming about in the vicinity of the camp, searching for eggs. I was unlucky, however, and found but one nest, that of this species.

" A tunnel, sloping upwards, had been dug by the bird into the sandy bank of the choung. It was about $3\frac{1}{2}$ feet deep and 2 inches in diameter, terminating in a chamber rounded like the bulb of a retort, and rather more in depth and width than the tunnel; it was unlined, and resting on the bare ground were four hard-set, rather glossy, white eggs; these measure 0.9 by 0.75, 0.9 by 0.74, 0.9 by 0.74, and 0.9 by 0.76."

Mr. W. Davison, also referring to Tenasserim, says :—" I found them breeding in Tenasserim, and on the 26th March, 1874, I took five eggs out of a hole running about two and a half feet in to the bank of a stream, at a place some thirty miles north of Yea."

These eggs are of the usual Bee-eater type, pure white, very glossy, almost spherical. They are smaller than those of *M. philippinus* and *a fortiori* than those of *M. apiaster*, but they are considerably larger than those of *M. viridis*.

They vary in length from 0.82 to 0.92 inch, and in breadth from 0.72 to 0.81 inch, but the average of a large series is 0.87 by 0.76 inch

Order BUCEROTES.

Family BUCEROTIDÆ.

Dichoceros bicornis (Linn.). *The Great Pied Hornbill.*

Homraius bicornis (Linn.), *Jerd. B. Ind.* i, p. 242.

Dichoceros homrai (Hodgs.), *Hume, Rough Draft N. & E.* no. 140.

Dichoceros bicornis (Linn.), *Hume, t. c.* no. 140 bis.

Col. Tickell gives us the following account of the nidification of the Great Pied Hornbill :—

" Kyik, on the Hounghthrau River, February 16th, 1855. On my way back to Moulmein from Mooleyit (a celebrated peak in the Tenasserim Range), when halting at Kyik, I heard by the merest chance from the Karen villagers that a large Hornbill was sitting on its nest in a tree close to the village, and that for several years